

A WAR-MODIFIED COURSE OF STUDY

FOR

THE PUBLIC SCHOOLS OF COLORADO

ISSUED BY

THE DEPARTMENT OF PUBLIC INSTRUCTION,

MARY C. C. BRADFORD, Superintendent

1918

VOLUME III

THE WORLD OF NATURE AND OF MAN



*"No child should have less opportunity for
education because of the war"*

—Woodrow Wilson

PREPARED BY
MARY C. C. BRADFORD
AND CORRELATING EDITORS

1918

DENVER

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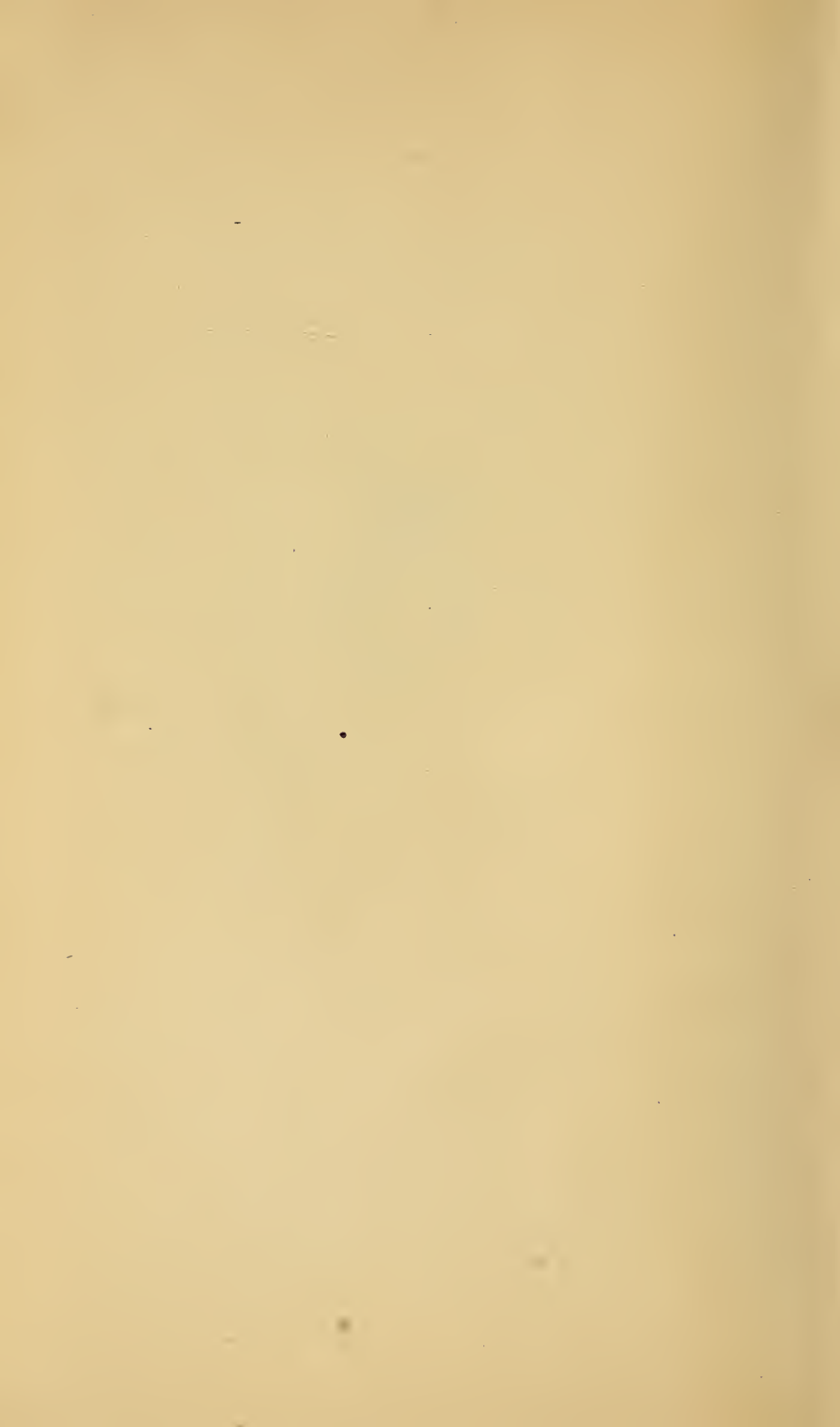




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NOTICE

Teachers of Colorado:

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The State of Colorado provides these books, paying for them from the State School Fund. They are ordered by your County Superintendent for use by any teacher who may be in charge of the school where you are now teaching.

War service demands conservation of books and all other school material. Therefore, as a matter of honor and an obligation of patriotism, please regard this book as public property, not for personal ownership.

Mary C. C. Bradford.

State Superintendent of Public Instruction.

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FOREWORD

This volume of the War-Modified Course of Study contains those subjects that are essentially interpretive of matters in relation to nature and society.

The co-operating educators are: T. Gilbert Pearson of the National Association of Audubon Societies, also G. A. Barker, H. S. Phillips, Mary K. Sherman, Alvin Kezer, P. L. Clarke, Inga M. K. Allison, G. A. Raeth and Ivan Sample of Colorado. To them I offer the thanks of the teachers and school children of Colorado, and I urge that the teaching force give most sympathetic response to the outlines and suggestions offered by these expert school people.

The contributing architects are: Mountjoy, French and Frewen.

Mary C. C. Bradford.

State Superintendent of Public Instruction.

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GEOGRAPHY

FIRST GRADE

SAND TABLE WORK.—Europe worked up by teacher. Mountain ranges in relief. Oceans or other large bodies of water,—pieces of glass or mica. The location of the French and other fronts.

Stories of life among the children of France, Italy, Belgium and Russia read to children.

CORRELATION OF NATURE STUDY WORK.—Plants and trees of European origin that grow with us and along French roadsides and in the lanes of Italy: Lombardy poplar, silver leaf poplar, white birch, apple, pear, plum and cherry.

Colorado crops that grow in France: wheat, rye, oats, barley, corn, potatoes, turnips, radishes, beets, lettuce, spinach, carrots, parsnips and onions.

Animals we have in Colorado that we would see in France: horses, cows, sheep, goats, chickens, turkeys, geese, ducks, guinea fowls and English sparrows.

SECOND GRADE

The making of a map of your own locality, first of schoolroom, then of school yard, finally of town or of several miles adjacent to school, with roads and farms as well as farm buildings marked out. Bring up with the children the difference between an American countryside with thinly scattered countryside buildings being each on the farm of its owner, and apart from the buildings of the neighbors, and the buildings of a French countryside, crowded together in a village with a patchwork of farms with no buildings in between villages. Draw an idealized map on the board to show pupils the little patchwork of French farms without house, each farm from ten to forty acres, and the Colorado farms with houses on an immense 160 to 640-acre area. Bring out which country is the more thickly populated.

THIRD GRADE

The study of the products of your own locality insofar as they may be related to the war. How does the growing of wheat by your father help your brother and your neighbor's boys in France?

How does it help the French? Why haven't the French plenty of wheat themselves? In the same way, the sugar beet, Mexican beans, cattle, hogs, sheep. Trace a bushel of Mexican beans from your farm into the hands of a cook in France. Start with your own railroad at nearest place, trace to seaboard on board convoy, landing at Bordeaux, on railroad to railhead, and by auto truck to front.

FOURTH GRADE

How Colorado is helping in the war. The minerals of Colorado's mountains and how they are used in war materials. Lead and zinc from Leadville, tungsten from Nederland, vanadium from Vanadium, etc.:

Lead—Bullets.

Zinc—Alloy in brass materials.

Tungsten and Vanadium—Tempering steel.

Colorado coking coal from Trinidad and Walsenburg and its mission in smelting steel for shrapnel and cannon.

Colorado pantry open to the Allies: corn, wheat, oats, sugar, Mexican beans, navy beans, onions, potatoes, etc.

Colorado food manufacturing industry as aiding the soldiers and our Allies: (1) sugar, (2) canned peas and beans, (3) canned tomatoes and pumpkin, (4) flour, (5) condensed milk, (6) butter.

Colorado as a recuperation center for wounded and invalided soldiers. Work out here from State Course of Study the good feature of Colorado's climate.

FIFTH GRADE

THE UNITED STATES.—The resources of which will win the war. United States has fourteen times as much iron ore as Germany and thirty-three times as much coal.

United States has 108,000,000 people and Germany 68,000,000.

Germany is only the size of the single State of Texas, contrasted to the total United States area.

Germany has not much variety of climate, hence is not capable of growing the variety of crops found in the United States.

1. Germany grows no olives, oranges, figs, dates, almonds, peaches, cotton, sugar cane, rice, peanuts.

2. Germany grows little corn and tobacco.

3. Germany grows many potatoes, much wheat, oats, rye, barley and turnips.

What crops in the above list grown (List 182) in United States yield oils or fats from their seeds? Can you see why Germany is suffering an oil and fat famine while we are not?

Make a map suggesting war material (food, lumber, ammunition, etc.) derived from each state. Be able to tell in a moment what Michigan, Texas or Arizona contribute to Uncle Sam in war material.

Discuss the shipbuilding industry, telling where we are building our iron, our wooden and our concrete ships. Make a map of United States showing the location of the various cantonments, or soldier camps. Tell where you have friends.

SIXTH GRADE

Europe looms so large upon the world map of the present that it should occupy a larger portion of the rest of the time taken up than it usually does. This should be done by trespassing upon the time usually spent on Asia, Africa, Australia, South America and the parts of North America south of the United States. This is not suggested as a permanent plan, but one that will give results while the interest in the war is at fever pitch.

THE ARCHITECTURAL PLAN OF EUROPE

Europe is all built around a *core* and this core is not the highest mountain range, the Alps. The core of a continent is the *oldest land* of that continent and the Alps are not the oldest land of Europe. The core of the European continent runs from northeast France and Belgium, through central and south Germany, to the mountains of northern Austria. This core is composed of old crystalline rocks; for instance, granite and slates.

Now such old crystalline rock areas are likely to be rich in metallic minerals, and this is true of this crystalline core. Iron, copper, zinc, lead, silver and even nickel are found in this crystalline core. Now most of the crystalline core lies in the Central Empires, giving them most of the iron and other minerals, as contrasted with France and England. A large part of the iron of this crystalline core was acquired by Germany when she stole Alsace-Lorraine from France in 1870, and during the present war she invaded French Lorraine and occupied the iron fields of Brie, hoping to keep them after the war and be the "iron master" of Europe.

Now we have four great crystalline cores in the United States, the Lake Superior Region, the Piedmont Plateau in east United States, the Ozark Mountains and the Rocky Mountains. Most of our metallic mineral wealth is concentrated in these crystalline core centers.

In the Colorado crystalline core we get lead, zinc, silver, gold, copper and tungsten. In Wyoming we get in addition iron.

When you come out of the mountains at Canon City, Manitou, Morrison, Golden or Lyons, you pass into the "hogback" country, in which you have layers of rock slightly tilted up towards the mountains west of them. These rocks usually end in a cliff-like slope on the western side (mountain side) and a gentle incline eastward. In these foothill rocks we get our coal and gypsum, two of our chief mineral materials.

Germany also has foothill rocks around her crystalline core and in these foothill formations coal and potash, two great mineral products, are found. These foothill rocks are in France and Belgium as well as Germany, and Germany was as much interested in invading the *coal fields* of her enemy as in capturing their cities. Lens and Lille are two cities in the French coal district, Liege is one in Belgium.

The coal fields of Poland were also invaded by the Germans.

Why did Germany desire to invade the coal and iron fields of her enemy? The foothill rocks of France, just west of the Vosges, give steep wall-like faces to Germany and gentle sloping faces west toward Paris. Germany invaded Belgium so as to go north of these foothill rocks and later failed at Verdun because of them. Why?

SEVENTH GRADE

RACES OF EUROPE

We are prone to judge the *race* of a man by the *speech* upon his lips, but obviously this is an absurdity. A negro who speaks English is not an Anglo-Saxon, nor is a Mexican Indian who speaks Spanish of the Spanish race. Speech means merely a contact in the past, often due to conquest, of two peoples. The old racial classification, Celtic, Teutonic, Latin and Slavic, has gone into the discard today. We no longer believe in the old Aryan race theory, which was based entirely on language.

Instead today we believe in a classification of white mankind in Europe on physical characteristics, like color of hair, color of

eyes, stature, shape of head and features. By such a division we classify European peoples into three primary races:

1. Nordic—tall, blond, blue-eyed, long, narrow head and elliptical face.

2. Alpine—short, stocky, “heavy set,” broad-headed, round-face, medium hair and eyes neither decidedly dark nor light.

3. Mediterranean—short, slight, almost black hair, usually curly, dark complexioned, dark eyes.

All European peoples of the white race come under this classification. They are composed of these races or mixtures of them.

French	North French—Nordic
	Central French—Alpine
	South French—Mediterranean
Great Britain and Ireland	East England—Nordic
	Welsh—Mediterranean
	West English, Irish, Highland Scotch— Mediterranean and Nordic
Germany	Northwest Germans—Nordic
	Southwest Germans—Alpine
	Prussians—Nordic and Alpine
Italy	North Italians—Alpine
	South Italians—Mediterranean.
Spain—Mediterranean.	
Norway, Sweden and Denmark—Nordic.	
Belgium	Walloon—Alpine
	Fleming—Nordic
Holland	Seacoast—Nordic
	Zuyder Zee—Nordic and Alpine
	South Holland—Alpine
Austria-Hungary—Nearly pure Alpine.	
Switzerland—Alpine and little Nordic.	

Bulgaria, Serbia, Roumania—Largely Alpine.

Greece North—Alpine and Mediterranean
 South and Islands—Mediterranean.

Russia—Nordic and Alpine and small amount of Tartar in
Ukrainia and south Russia in general.

SO-CALLED YELLOW OR MONGOLIAN RACES

It is generally the custom to call the Turks, Hungarians and Finns yellow races, because they speak a tongue originally used by yellow peoples. All these races are so crossed and recrossed with white peoples that all trace physically has been lost of a Mongolian origin. The Finns, racially, are tall, blond Nordics, the Hungarian (Magyar) and Turk are Alpines.

THE POLITICAL EFFECT OF SPEECH VS. RACE

We must not, however, underestimate the effect of language on national ideals and solidarity. The French have the three races of Europe within their boundaries,—no other nation presents such a psychological unity as the French. The French speak one language. The peoples of Austria-Hungary are almost entirely of Alpine race. Yet they speak nearly a score of languages, with the result that each language group is endeavoring to be independent politically.

It is not important whether the Roumanians speak a Latin tongue because they are really blood relatives of the Italians, or that they merely think they are, when really they are not related to the Italians. The result is the same in international good feeling.

We must endeavor to separate the effects of language and race. Language determines national ideals, national boundaries, national friendships.

Race determines the physical and mental characteristics of a race. Language determines the friendship between Italy and Roumania, based on a common Latin speech,—race determines that the Italian shall be artistic and the Roumanian shall not be so gifted.

CHARACTERISTICS OF RACES MENTALLY

In general the Nordic is the race of action, initiative combativeness and restless emigration.

The Alpine is the race of plodding toil—the peasant race of Europe, conscientious, hard working, good at detailed task, uneducated, makes a splendid peasant educated, a splendid microscope maker or watchmaker. It is the race interested in details somewhat unimaginative.

The Mediterranean is the artistic race, having many potential artists, musicians, orators and actors.

Of course blends of these races produce every imaginable variation of temperaments and gifts in the various nations of Europe, as all sorts of crosses take place between the various races.

Have the children in your room grouped according to races and also according to nationality. They take a keen interest in such work.

In this grade the newer kingdoms-to-be of Poland, Jugo-Slavonia and Czecho-Slavonia should be found with their boundaries. Find the part of Austria that is tied to Italy by language, to Roumania by language. This work above outlined is merely for the purpose of supplementing the work on Europe in the State Course of Study.

EIGHTH GRADE

A study of the geography of the eastern and western battle fronts, with names of towns and pronunciations. Watch weekly periodicals like Literary Digest, Outlook, Independent, etc., also daily papers, for such materials.

Study Asia, Africa, Malaysia and the South Seas in the light of the colonies taken from Germany in these regions; also the trade lost to Germany.

Study South America from the standpoint of lost German trade and what America can do in gaining the trade markets. Study the Statesmen's Yearbook for such information. Supplement with study of these continents in the State Course of Study.

NATURE STUDY AND SCIENCE

A period of twenty minutes a day for three days a week for the first three grades, and of thirty minutes a day for the other grades, should be given to this subject. The oral Geography of the first three grades can be very closely correlated with Nature study. Much of the work should be out of doors, and all should draw on actual experience as far as possible. It should deal with experiences of the pupils rather than with knowledge gleaned from books, although such sources should be drawn upon to supplement the experiences of the child's environment.

In the lower grades, the attempt should be to question nature in the world about us rather than develop logical scientific knowledge. The teacher should guide the child as to the things he may look for rather than simply to impart knowledge.

Whatever belongs to the environment of the normal child is legitimate material. As the environment of the child in this state varies very much, any course of study must be suggestive only. The most important thing is for him to be so directed as to see and question nature about that which is to be found all about him. The smallest school on the plains or in the mountains offers a wealth of material for this study. No text-book is a prime necessity, although there are many books and charts which would be helpful to supplement local observations.

Subject matter should be the animals and plants that are the source of our food, clothing, and shelter; animals and plants that are beneficial or injurious to the production of these sources; animals which make good pets or which are domesticated so as to be useful to man; plants which make beautiful gardens and parks; and the wild flowers of our state. Food production, conservation and distribution are of the greatest importance, and tie all these subjects to everyday life.

Nature phenomena, all about us, furnish appropriate material for the teacher who has the inquiring mind and is seeing what nature is doing. The heavens, the air, the earth, are open books which the children should be taught to question.

The upper grades may well investigate the laws of heat in relation to the heating of houses; heating of the soil, as related to the water; the production of air currents (winds); the formation of storm centers and expansive force of steam, evaporation and condensation of rain; study the chemistry of the loaf of bread; of a

cake of soap; a few elementary common machines as the principle of the gas engine (internal combustion engine), the cream separator, the electric motor and electric light; electro-magnet, as found on the door bell; or other machines; elementary agriculture.

The following is a quotation from a course of study compiled by a group of teachers for the Denver schools:

“The method of teaching Nature Study must be scientific, not only that conclusions may be the *truth*, based upon careful and continued observation leading to unbiased conclusions after the facts are all obtained, but that pupils may gain control of the scientific method of observing life and attacking its problems.

“The teacher who has had little of scientific training should become a learner with the children. No way is more legitimate nor more fruitful in securing higher results in character training than through studies which will open the eyes of student and teacher to the beauties of the world, to adaptation of structure to function in the natural world, and to the lessons which we may read in nature. No place in the world could be richer in subjects than our own environment. The color combinations of our landscapes, our clouds, our lakes and our mountains; the graceful shapes of our mountain trails, our winding streams, the outlines of our ranges—all these may be seen from the schoolroom windows. The protective coloring of our horned toad, the stubby nature of foliage on our dry plains, the cottonwood tree pruning itself, the habits of growth of the lodge pole pine and its cone, whereby it quickly covers forest areas denuded by fire,—all illustrate the wonderful and mysterious adaptation of structure to use.

“Not the least of the social ideals attained in this study is that gained by the pupil who is allowed to bring information and material to the teacher and classmate, or better, to take his associates to the spot where he has made his discoveries.”

FIRST GRADE

AUTUMN.

1. Plants.

- a. Flowers; classify as to color, purpose of flowers, special study of sunflower, aster, and dandelions.
- b. Seeds; forms, protection, dispersal, use to plants, use to man.
- c. Leaves; evergreen and deciduous, use to plant, forms, change in color, use in fertilizing plants.
- d. Roots; storehouses, edible roots.

2. Birds.

Migration, study of finch, robin, and any local birds; usefulness of birds in destruction of insects and weed seed. The carrier pigeon would be of great interest at the present time.

3. Insects.

Preparation for winter by the ant, bee, and caterpillar.

4. Squirrel's preparation for winter.

5. Sheep.

The thickening of coat of wool for winter protection, and our use of it for clothing; food and habitation of sheep; use as meat, and importance to man.

6. Formation of clouds; the direction of winds.

Food.

Observation and some participation in gathering and storage of food, as beans, potatoes, tomatoes; seeds, as nasturtium, poppy, sweet pea, radish and other seeds; observe the removal and storage of crops from the field; fall plowing; care of cattle and poultry.

WINTER.

1. Forms of water; snow, frost, hail, sleet.

2. Domestic or other animals; the cow, horse, cat, dog; pets.

3. Peoples, and methods of living; Eskimo, Indian, etc.
 "The Seven Little Sisters," and like books, are a good basis for this work. Whenever possible, pictures showing the lives of these people and any articles which are used by them should be had in the class.

4. Food.

Note manner of keeping stored food and visit such stores where possible; the use and care of the cow and her products; the making of butter and cheese; cooking of fruit and vegetables; make candy.

5. Clothing.

Change for season; distinguish between cotton, wool, and silk; visit shoemaker, and determine source of leather.

SPRING.

1. Returning birds; robin, bluebird, and other local birds.

2. Winds; influence on rain, on temperature.
3. Germination; make a window garden and observe germination of bean and other seeds.
4. Awakening of insect life.
5. Trees; buds, the rising sap, the growth of the leaves.
6. Flowers; violet, crocus, daffodil, daisy.
7. Effects of insect on fertilization; appearance of the butterfly.
8. Hen and chickens and other domestic fowls.
9. Gardening and food production.
10. Food.

Plant seeds in eggshells or small pots to take to home gardens to plant; plant four-o'clocks, nasturtiums, radish, lettuce, beans; spring work of farmer; visit fields to watch plowing and sowing.

SECOND GRADE

AUTUMN.

1. Flowers; golden rod, primrose, poppy, gladiolus. Separate into endogenous and exogenous—not using the names; use to bee; to man; to plant.
2. Fruit; classify as to color, manner of protecting seeds, edibility, other uses. Study apple, nut, orange.
3. Seeds; review dispersal and protection; food-saving seeds for spring. Gather seeds. Study the common food seeds, as wheat and corn; the common food tubers, potato and turnip.
4. Fall marketing of farm crops; cornmeal, hominy, breakfast foods, flour, cornstarch; preparation of meal or flour by grinding.
5. Clothing; get a boll of cotton, where possible; observe fibres of raw cotton; pick out seeds; story of cotton by pictures,—spinning, weaving, dyeing; observation of sheep; food; shearing; spinning and weaving of wool.

WINTER.

1. Preparation for winter; hibernating of the snake, bear, and frog; chrysalis forms; winter preparation of bees, ants, squirrels.
2. Snowflakes; crystal forms; protection given by snow: conservation of the water supply by snow in mountains. The reindeer, wolf, fox, etc.

3. Nations; Japanese, Chinese, Filipinos.
4. Study of evergreen tree; coal; iron, as needed by man.
5. Food of races studied,—Japanese, Chinese, Eskimo, Indian; storage of food by squirrel and bee; use of the refrigerator; cold storage plants.
6. Study evergreen tree, coal, iron, as needed by man.

SPRING.

1. Germination; peas, beans, corn, pumpkins.
2. Gardening; necessary soil conditions, fertilizing, irrigating. Second grade pupils should know the common vegetables, as radishes, lettuce, peas, beans, etc. They should plant and care for small plots, either in home or school garden. It is of great economic importance that the elementary principles of agriculture be taught in all grades.
3. Winds; as related to climate in home locality; windmills; kites; sailing vessels.
4. Returning birds; study swallow, wild goose or duck; nesting, food, use to man.
5. Garden friends and enemies.
6. Butterflies, moths.
7. Parts of flowers; work of bees; butterflies and wind in fertilization.
8. Pussy willow, sand lily, anemone, daffodil.

THIRD GRADE

AUTUMN.

1. Flowers; cosmos, dahlia, evening-star, pansy.
2. Seeds; special study of tree seeds, maple, cottonwood, elm, pine, mountain ash.
Special study of cotton; uses of the seed and of the fibre.
Compare the cotton fibre, in usefulness, with the great animal fibres, wool and silk. Manufacture of clothing from these fibres.
3. Fruit; various ways of preserving for winter use. Study the melon, peach, acorn. Gather seeds; plant bulbs, crocus, tulip, hyacinth; start geranium cuttings.
4. Root crops; beets, sweet potatoes, etc.

5. Winds; add to previous knowledge, as to direction of winds, the effect on climate. Clouds; kinds of cloud, cause of clouds, rain.
6. Soil; sand, clay, loam. Cultivation of soil. Study the soil in the making in your immediate locality.
7. Winter preparation of trees, as the cottonwood and maple, or any local trees in your neighborhood.
8. Insect life; review the life history of insects. Study the grasshopper and his habits, as they can be observed by the children.

WINTER.

1. Animal life of locality; also the bear, beaver, rat.
2. The action of running water and of frost on rocks and soil formation. Water-power and generation of electricity; natural electrical phenomena.
3. Nuts; study the peanut, walnut, etc. Value to man as food.
4. Foods; production of sugar, flour, meat.
5. Minerals; gold, silver, lead, iron, copper; uses of same and importance in industry.
6. Peoples; African negro, Mexican and Alaskan life.

SPRING.

1. The fly and mosquito; life history; danger to man: extermination.
2. Gardening; the germination of seeds, as flax, squash, bean; gardening conditions reviewed; garden friends and enemies; the extermination of insect enemies; the killing of weeds. Plant the garden. Each child should have his own cultivated plot in the home garden.
3. The value of birds and their need of protection. Nesting: food and habits of woodpecker, or some local bird. Blue jay, sparrow, meadow lark.
4. Flowers; sand lily, anemone, primrose, Easter lily; fruit blossoms.
5. Winds; clouds, rain, dew. Explain reasons causing the different forms of moisture.
6. In what way do sunbeams feed plants?
Study the sap of the tree. How does it help the tree?
How does it help man?

Stems; endogenous; exogenous.

Leaves; parallel veined; netted veined.

7. Common butterfly families; name two; monarch, tiger, swallow-tailed, suggested.
8. Products of other countries in common use; tea, coffee, rice.

Stories and references for the suggested work of the first three grades may be found in the following list:

In the Child's World, Roulson.

How to Tell Stories, Bryant.

Stories to Tell, Bryant.

The Story Garden, Lindsay.

The Children's Hour, Bailey.

The Story Hour, Kate D. Wiggans.

Cat Tails and Other Tails, M. H. Howliston.

Bell of Atri, Tennyson.

Birds of Killingsworth, Longfellow.

Mother Stories, Lindsay.

Storyteller's Book, O'Grady.

Letters from a Cat, Helen Hunt.

Cats and Dogs, Johannot.

Birds I Have Kept, Olive T. Miller.

Trees and Peaks, Eva Bird Bosworth.

Practical Nature Study, Coulter & Patterson.

Bulletin No. 33, United States Department of Agriculture.

Sleeping Beauty.

Three Bears.

Three Pigs.

FOURTH GRADE

AUTUMN.

- I. Observation of birds should be made throughout the year, in order to know the real birds. Museum specimens are to be had and colored plates are plentiful.

1. List.

Choose from bird-list at end of nature study, birds which are in children's environment.

2. Outline for bird study.

- a. When and where seen; special haunt, seen alone or in flocks.

- b. Appearance; size, color, special markings, flashes of color seen when bird flies.
- c. Action; running, hopping, wading, flying. Flight; sailing, darting, wavelike motion, much flapping of wings, steady, etc.
- d. Songs and calls.
- e. Migration.
- f. Nesting habits.
- g. Food.
- h. Use to man.
- i. Protection.
- j. Bird laws.
- k. Attracting birds.

II. Continue study of plants started in spring in home gardens or fields; decide which are preferable for food; the harvesting and storing of such foods; cutting and threshing of wheat and oats; husking and storing of corn; digging and storage or shipment of potatoes; cutting and threshing of beans.

Gathering and storing of gladiolus or dahlia tubers. Gather various flower seeds for spring planting.

III. INSECTS.—The tomato worm will usually be found in gardens; work out its life history by feeding worm until it forms chrysalis, and later hatches out the butterfly.

Lady bugs found in garden; what valuable work are they doing?

Bees as honey makers; study life and habits; feed on and prepare sweets which would otherwise be lost; money value to homes.

WINTER.—Mammals.

- 1. Suggestive list.
 - Black and grizzly bear.
 - Mule deer and prong horn.
 - Coyote.
 - Prairie dog.
 - Mountain lion.
 - Mountain sheep.
 - Buffalo.
 - Beaver.
- 2. Outline for study and comparison.
 - a. Where native.

- b. Movements in walking, running, trotting, jumping, crouching, seizing prey, feeding; in play, fear, or anger.
 - c. Coloring; general color, markings, differences with age and season.
 - d. Cries and calls.
 - e. The animal in repose.
 - f. General shape and characteristic features.
 - g. Care and feeding in captivity.
 - h. Food and habits in wild state.
 - i. The young.
 - j. Relation to man. Destructive as well as advantageous qualities. Method of control of injurious animals like the rat.
3. Study the phases of moon for one month of the year, as in January, from new moon to new moon; its varying shapes and positions in the sky; its path across the sky; the time from one phase to the next; direction of travel; reason for its different appearances.
 4. Keep a shadow-stick throughout the year, measuring and recording the lengths of shadow and comparing with the variation of hours of sunshine in the day; associate with latitude; compare the varying amount of heat received by the earth and influence on seasons.

SPRING.

IV. Trees and Shrubs.

1. Value of forests and trees to Colorado.
 2. Practical applications.
 - a. Kinds to plant. Our rapid growing natural trees, cottonwood and box-elder, willows and poplars; good for a time or where others will not grow readily; but the slower growing, such as maple, elm, and ash are more desirable.
 - b. Rules for planting.
 - c. Care until well started.
 - d. Fruit trees which will bear in your locality.
 - e. Ornamental shrubs.
- V. Continue study of trees and shrubs about your school yard or in your locality, including evergreens and deciduous trees.

Consider the following points: Differences in shapes and masses of foliage; relation of trunks and branches; changes of color; development of seed or fruit; yearly growth; the formation, growth and protection of buds; swelling and bursting of buds, their location, terminal and lateral buds; the use of buds; flowers, fruit, distribution of fruit; insect enemies and helpers; value of bird visitors; spraying to kill insect enemies; cultivation of ground about trees; pruning; raising of small fruits, currants, raspberries, etc., on small plots of ground in gardens or yards. Emphasize the economic value and value in health of these fruits to the family. Even in the arid parts of the state, small hardy fruits may be raised by local watering and by protection from winds.

FIFTH GRADE

The general idea is a study of plants, animals, and soils in relation to their value and disadvantages in gardens, lawns, and fields, and a beginning of a study of agriculture; also a study of conservation in methods of using fuel in heating houses.

I. AUTUMN.

1. Reports with sketches, maps, and exhibits of products of summer gardens. Lists of cultivated flowers and vegetables.
2. Injurious insects which are laying eggs in the ground, on trees, and in other places. How to control them. Government bulletins will be helpful. See *Relation Between Birds and Insects*, Year-book, 1908; *The Grasshopper Problem*, Cir. 84, U. S. Dept. of Agriculture, Bureau of Entomology; *Usefulness of the American Toad*, Farm Bulletin 196.
3. Fall preparation for next summer's garden and lawn.
 - a. Clearing away garden refuse.
 - b. Turning over soil and fall fertilizing where advisable.
 - c. Gathering seeds.
 - d. Leaving lawn grass proper length.
 - e. Burning weeds on nearby vacant lots.

II. WINTER.

1. Study of snowfall with special reference to conservation of water for next summer's irrigation; value of forests in water storage and prevention of floods.

2. Great mineral resources of state; iron, coal, copper, silver, lead; other valuable metals; building stones; granite, sandstone, lava stone, marble.
3. Toward spring, make planting plans for season, and test seeds by germination.
4. Observe winter birds.
5. Combustion, and heating of houses; fuel; conditions necessary to burning; heating by means of stoves, hot-air furnaces, steam, hot water; ventilation; danger of overheating; saving fuel; sources of fuel—wood, coal, gas; sun as source of all energy; connection between discovery of fire and growth of civilization. Study coal; kinds of coal beds; methods of mining, transportation; making and uses of charcoal and coke.

III. SPRING.

1. Identify most common weeds. Study methods of control of weeds which infest lawns and gardens, as plantain, dandelion, wild lettuce, and the various wild grasses.
2. Report on work done on lawns and gardens for the coming summer.
3. Take up poultry, bee-keeping, raising of hares, or some such specialized topic within experience of the pupils.
4. Keep record of the return of the birds. Study nesting; protection of birds and eggs; attracting useful birds by providing houses and material for nests, food, drinking and bathing places.

ELEMENTARY AGRICULTURE.

1. Distinction between dead and living matter; protoplasm; amoeba; cells.
2. Soil and soil water in growth of plants. Evaporation from soil; from plants; capillarity in soil; circulation of water in soil; taken up by plants; need of cultivation; weeds rob plants of water; prevention of waste of soil water.
3. Feeding by plants; food taken in solution; water, mineral matter and carbon as plant food; sources of this food, the air and the soil.
4. Making of starch in the presence of the sun and chlorophyll; made in the leaves of the plant; sun as source of all energy.

5. Parts of plants as connected with growth; roots, stems, root hairs, buds, leaves.
 6. Soil; origin, good soil, humus, cultivation of soil, fertilization by the introduction of plant food, as nitrogen, phosphoric acid and potash. Common fertilizers; manure, commercial fertilizers and fertilization by bacteria on roots of alfalfa and other legumes. World-wide search for potash supplies today. Fertilization by plowing under crops; rotation of crops.
 7. Saving of soil moisture; by cultivation, by drainage, by having humus in soil, by mulching.
- Irrigation and dry farming. Influence of irrigation in fertilizing land; examples in our irrigated sections, in Nile Valley.

SIXTH GRADE

I. TREE STUDY.

1. Observe and make lists of various kinds seen. Have pupils name trees at sight and from leaf, bark, picture, description.
2. How trees live.
 - a. Roots furnish mouths to get food from soil.
 - b. Leaves serve as breathing organs and help to prepare food.
 - c. Trunk and branches transport food and spread leaves to light.
3. General appearance of trees from distance; spreading, compact, loose, conical, drooping, erect, etc.
4. Bark. Describe.
5. Leaves. Shape, color, margin, etc.
6. Usefulness and importance.
 - a. Use of lumber, wood, shade, nuts, etc.
 - b. Which grow faster, hard or soft woods?
 - c. Which are more desirable to plant, rapid- or slow-growing trees?

II. LUMBERING.

1. Make collection of available kinds of wood; learn to recognize each kind; hard woods, soft woods; list of trees, making each kind of lumber; give at least one use of pine, oak, poplar, hickory, mahogany; cause of

- grain in wood; what is quarter-sawed lumber, and why more valuable?
- 2. Visit lumber camp or mill, if possible; describe cutting of trees; transportation of logs to mills and making of lumber. What may be done to prevent forest fires?
- 3. What is the government doing in making new forests (reforestation)? Why?

III. FORESTS OF COLORADO.

- 1. What their protection and replanting means to the state. Forestry department. Forest reserves. Life and work of forest rangers. "The average saw-log cut today began to grow about the time Washington used his hatchet."—*Enos Mills*.
- 2. Special study of evergreens of Colorado (Reference, *Evergreens of Colorado*, by Burton O. Longyear. Publication No. 1, State Agricultural College).
 - a. Learn to recognize a few cone-bearing trees; yellow pines, silver spruces, etc.
 - b. Leaves. Needles; count number of needles in bundles, with or without sheath at base; uses of needles; moaning of wind in pines.
 - c. Cones. Position on trees; scales thick, hard, and woody, or thin, leathery, and papery; scales protect seeds; winged seeds; nearly all species take two years to mature; pollen producing cones distinct from those which produce seeds.
 - d. Uses of cone-bearing trees. Lumber, pitch, balsam, turpentine. Uses of Colorado evergreens.

IV. FISH AND WILD GAME OF COLORADO.

- 1. National game preserves.
- 2. Laws for birds, fish, and game protection.
- 3. Fishes.
 - a. Characteristics. Fins, tail, gills, breathing, swimming, bladder.
 - b. Work of hatcheries and re-stocking streams.
 - c. Study of the trout.

V. SOILS, ROCKS AND PHYSICAL FEATURES.

- 1. Review and intensify study of clay, loam, sand.

2. Kinds of rocks one can pick up in vicinity. Crystals, petrified wood, water-worn stones, igneous rocks, fragments of sandstone, granite, etc.
3. MINERALS. Make a collection of minerals in your locality; name as far as you can; classify for each of these qualities, making lists of classes; hardness, weight, color, transparent, translucent or opaque, elasticity.
4. Collect samples of iron, lead, copper, silver, gold, and other valuable ores. Learn to tell by sight, the chief metal in each sample. Effect of great heat on metals; origin of clinkers in stove; of glass; compare lava, porphyry, pumice stone with limestone, sandstone or shale. Effect of fire.
5. Visit quarries, mines, smelters or foundries, if possible. Make collection of building stones of the community. Brick and brick-making. Cement-making; concrete construction.

AGRICULTURE.

1. Germination of seeds; soil water and air necessary; value of pressing the soil about seeds; selection of seeds having good germs; prevention of fungus diseases, as smut by dipping wheat seed in blue vitriol solution.
2. Testing of seeds for germination; seed testers and practical use of same; loss of power of germination with age.
3. Study method of growth of seeds by planting beans, radishes, peas, wheat.
4. Seed improvement by selection; cross fertilization.
5. Propagation from buds, layering, cuttings, grafting.
6. Transplanting; preserve root hairs; trim tops to correspond to rootlets broken off; plant in fine, rich soil; trim off broken and mangled roots; keep roots moist before and after planting; keep the soil moist and shaded; transplant trees and shrubs only when leaves are off.

SEVENTH GRADE

In presenting science and nature study to the seventh, as well as to the eighth grade, it is the aim to meet the demands for the curious in pupils of this age; to create a liking for science, and to

lay a broad informational basis. The studies are offered in the light of present needs, rather than as a preparation for future work.

Where there is a Junior High School, the work in agriculture suggested here should be briefly covered in the sixth grade, so as to keep the unity of the work.

I. WEATHER.

1. Cloud forms.
2. Forms of precipitation.
3. Temperature of atmosphere.
4. Humidity of atmosphere.

II. *In the study of climate*, continually observe the adaptation of structure of plant and animal life to local conditions.

III. *Use lists of Colorado plants and animals* to be found at end of this course to interest pupils in identifying as many species as possible. To be able to recognize and name many of our wild flowers and weeds, mammals, birds and trees is an accomplishment worth while.

IV. *Study at least one of the following areas of land carefully*, to discover the plant and animal life present. This is a valuable exercise, especially if pupils make individual observations with notebook in hand and report to class. Each time over the tract will add something new. Nothing is too insignificant to notice:

1. The Foothills Forest.
2. The Irrigating Ditch.
3. The Shallow Pool.
4. The River.
5. The Slope of the Hill.
6. The Swamp.
7. The Arid Plain.
8. The Country Roadside.
9. The Yucca Patch.
10. The Cactus Area.
11. The Sagebrush Area.
12. The Dry Creek-bed.
13. The Irrigated Garden or Lawn.

V. AGRICULTURE.

1. Eradication of weeds; early and careful cultivation; prevention of seeding; methods of killing; annuals; biennials; perennials.
2. Some common weeds; Canadian thistle, burdock, ox-eye, daisy, cockle bur; sow thistle; Russian thistle; sour dock; wild mustard; wild parsnip; quack grass; wild carrot; bind-weed or wild morning glory; prickly lettuce; long-leaved plantain. Methods of elimination based on habits. Study weeds of your locality and methods of eradication.
3. Insects and parasites injurious to plants; potato beetle, bean beetle, grasshopper, plant louse, etc. Fungus parasites. Study habits and methods of extermination. Various bulletins by the Department of Agriculture and by the State Experiment Station will be furnished on application. These bulletins treat fully on all classes of injurious insects and parasites.
4. Animals that destroy insects; ichneumon fly larvae destroy tree borers; lady bugs destroy plant lice, scales, and other insects, and have been largely imported for that purpose; dragon flies are great enemies of mosquitoes, gnats, and flies; toads feed largely on insects; swallows, vireos, woodpeckers, chickadees, wrens, swifts, cuckoos and flycatchers live largely on insects. Most owls and hawks catch many mice and rats. Study methods of bird-raising and protection as aids to the farmer.
5. Gardening; the importance of the garden to the town dweller, from a financial standpoint; the raising of small fruits in the garden, as strawberries, raspberries, currants, etc. The garden furnishes the practical thing which every boy and girl may care for with pleasure and profit, and which may be of the highest educational value. Each pupil in the seventh and eighth grade should have a definite part in maintaining the home by engaging in gardening or farming. Methods of conducting that work should be the foundation for part of the school work.

EIGHTH GRADE

I. AUTUMN.

1. Gathering and caring for crops from vegetable garden. Methods of storing, preserving, drying, evaporating. The silo. Cold storage. Parts used in food.
2. Cuttings. Bulbs. Grafting. Layering of grape vines and currants.
3. Injurious insects and fungi and their relation to the plants, shrubs, or trees on which they are found. Spraying trees and plants; insecticides. Relation of plants to soil culture. Beneficial insects, snails, slugs, toads and bird visitors and their relations to the garden.
4. Woods and reasons for their success.

II. WINTER. Topics chosen from outline on "Raw Materials of Colorado" and "Some Scientific Principles."

III. SPRING.

1. Seed-testing. Arrangement of crops in garden according to space needed, amount of light necessary, etc. Cultivation of garden. Flower garden. Care of lawn, shrubs, and perennials.
2. Hot-beds. Cold frame. Transplanting.
3. Rotation of crops.
4. Needs of plants. Light, water, food. Method of obtaining these.
5. Plans for landscape gardening.
6. Return of the birds. Bird boxes, nests, etc. Economic value.

RAW OR MANUFACTURED MATERIALS OF COLORADO

In connection with the industrial geography of seventh and eighth grades, study the nature side of the following raw materials produced in Colorado:

1. Agricultural, including grazing products.
 - a. Hay, potatoes, fruit, cattle, sheep. Where and how raised, varieties, conditions best adapted to their growth.
 - b. Cattle-raising; breeds of cattle raised for beef, and those for dairying purposes; characteristics of these classes; study specifically the kind best adapted to the local community; any improvement possible upon the methods used in your locality (could

more cattle or better methods of feeding and selling be used?); products of every-day use from cattle; importance of increased production in the United States.

- c. Dairying; a growing and profitable industry in this state; high food value at small cost in dairy products; definite return to small farmer on dry land farms, as well as on irrigated lands; dairy breeds adapted to your local conditions; methods of improving breeds; the cream separator and Babcock tester; results of care in feeding and handling cows.
 - d. Milk; composition (water, casein, sugar, mineral, albumin); food value; fat globules in butter; casein and fat in cheese; essential methods in making each. Pasteurization of milk. The International Harvester Company furnishes charts on these subjects, at cost of transportation.
 - e. (Sheep-, swine- and horse-raising should be the subjects studied where these are the prime industries of the community.) An elementary book on agriculture should be in use in every rural and village community.
 - f. Poultry-raising; egg breeds, as Leghorns, Minorcas, Houdans; meat breeds, as Bramahs, Cochins and Cornish, Indian Games; general purpose breeds, as Plymouth Rocks, Wyandottes, Rhode Island Reds, etc.; building houses; care; feeding for eggs or for meat; keeping free from parasites; another source of revenue for the boy or girl on farm or in town home.
 - g. Bees; honey as a food; study of life and habits of bee; method of honey production; profit in small plants; value of honey as a substitute for sugar. Encourage pupils to begin with a stand of bees.
2. Review metalliferous resources of state.
 3. Lumber production of state. Kinds produced; kinds imported; forest reservations; possibility of increasing lumber by planting; by conservation supply. Identify lumber used in a carpenter shop.

4. Gold, silver, coal, lead, tungsten, radium, oil; study methods of mining and smelting ores. Visit smelters, where available. Rare ores.

SOME SCIENTIFIC PRINCIPLES

1. Evaporation and condensation as related to rainfall; making of sugar or syrups from juices of cane, beet, or maple tree; effect on temperature; condensation in relation to making artificial ice; drying of fruits.
2. Barometer: Mercury and aneroid; what keeps the mercury in inverted tube; what is measured; what is high and low barometer; how may it measure altitude; how foretell changes in weather?
3. Thermometer: In closed and not open tube; what causes mercury to fall or rise in tube; boiling point; freezing point; effect of humidity of air on temperature; dry bulb thermometer.
4. Water supply; wells, lakes, streams; storing of water in snows of mountains; water pressure of town supply; securing pure supply; filtering; chemical purification; soft and hard water.
5. Mechanics of liquids; expansion under heat to form steam; use in engines; contraction to 37°F. and then expansion as it freezes; why does ice float; poor conductor of heat; effect of large bodies of water on climate.
6. Study a few constellations in their daily and yearly movements.

A LIST OF POSSIBLE PROBLEMS FOR SEVENTH AND EIGHTH GRADES; choose those which seem to be of the greatest interest to a particular school. In presenting these problems to the pupils for solution, no thought is given as to which particular science may be involved, but rather that they shall be topics of interest; and many of them are to be met in the pupil's immediate environment.

Present these subjects as problems for solution, and help in the solution by guiding the thought of the pupil, rather than by telling him things.

A brief outline of a type of lessons is given to suggest a possible method of treatment of some of the topics:

1. The aeroplane.

How is it possible to make a "heavier-than-air" machine rise into the air?

What is the difference in the way a balloon floats in the air and that in which the aeroplane rises in the air?

What is buoyancy?

What is the difference between the aeroplane and the dirigible? What similarity?

What are the advantages of each kind of these air machines?

How is the gas engine an essential to the success of any of these machines? Which?

Name some of the essential parts of the aeroplane, and give the uses.

What is the meaning of "a tail spin"? "a nose dive"?

For what particular purposes are each of these air machines used in the war?

Which may be used for commercial purposes in peace times?

2. A cake of soap.

Why is it said that "The state of civilization of a people may be determined by the amount of soap used"?

What are the essentials for soap-making? (Lye from wood ashes and fat.)

Describe how lye and fat were provided by the American pioneer. Describe how these pioneers made soap. (Many parents will be able to furnish this information.)

An interesting test of acid and alkali may be made by getting litmus paper from the druggist and testing vinegar, and also a solution of lye.

What is "soft soap"? "hard soap"? What is the difference in manufacture?

Why do some soaps irritate the hands so much more than others?

How does soap assist in getting the dirt and grease off the skin?

(Soap emulsifies the oils of the skin, and the dirt is carried off with the emulsified oils.)

Experiments: Make a lather on the hands, and then wash it off under running water. Notice how the dirt slips off with the lather.

Mix some kind of oil with water and shake in a test tube, and see that the oil soon separates from the water after coming to rest, and remains above the water. Shake with a solution of soap, and note the difference in action.

What is "hard water"? How may hard water be "broken"?

Why will soap and warm water remove dirt more readily than soap and cold water?

3. The nodules on alfalfa roots.

Dig up part of a root, and examine. Do the same with the roots of other plants, and see if all have like nodules. (The legumes are the plants which are likely to have the nodules on the roots.)

Do these nodules have anything to do with the productiveness of the plants?

Do the plants having the nodules seem to thrive less than those having no nodules?

What is meant by nitrate-fixing bacterial?

Is nitrogen to be found in the air? Can plants get nitrogen from the air? What are nitrates?

What are the principal chemical elements used by plants?

What are protein foods? What chemical element is found in protein food that is not in carbonaceous food?

Why does the growing of alfalfa enrich the soil?

4. Suggested topics.

Refrigeration; water supply; ventilation; steam engine; internal combustion engine, or gas engine; automobile; mining; explosions, pure air in mines; story of bread; story of the match; heating houses by hot air, by steam, by hot water; pumps; siphon; cream separator; pressure cooker; fireless cooker; vacuum sweeper; sewing machine. Bacteria, useful and harmful; carbon and its compounds; combustion; the story of limestone; the mariner's compass; meteors; electro magnets; door bells; telegraphy; wireless.

It will be seen that many of these topics will suggest search through textbooks as well as observation and personal experience. The pupil should gradually be taught to add to his own personal experiences by studying the experiences of others.

IT IS SUGGESTED THAT IN SCHOOLS WHERE SEVERAL GRADES are in the same room, the first, second, and third grades may be grouped together for nature study; the fourth, fifth, and sixth may form a second group. The seventh and eighth may study the same problems.

BOOKS OF REFERENCE

1. "Nature Study for Primary and Grammar Grades".....
..... Cummings

2. "Practical Nature Study".....Coulter and Patterson
3. "First Principles of Agriculture".....Goff and Mayne
4. "Agriculture for Beginners".....Burke, Stevens and Hill
5. "Science for Beginners".....Fall
6. "Physics in the Household".....Lynde
7. "General Science".....Elhuff
8. "General Science".....Elhuff and Eikenberry
9. "Elementary Science".....Coulter
10. "First Course in General Science".....Barber
11. "First Year Science".....Snyder

Classified list of Bulletins of the Colorado Experiment Station may be had on application to the station at Fort Collins.

Classified lists of all government bulletins may be had by application to the Department of Public Documents at Washington, D. C., on the payment of ten cents. These bulletins may be had through your representatives in Congress, free, or upon the payment of a small fee. Every school district should be supplied with those which meet local conditions.

NATURE STUDY LISTS FOR REFERENCE

In the following lists from Colorado Flora and Fauna, the attempt has been to name only those species which will most readily come within the observation of Denver children in the city and its suburbs, and in short trips on the plains and into the foothills. In the upper grades, however, the work may be greatly enriched by reading and hearing of plants and animals of our state which we cannot always study at first hand.

Bulletin No. 33 of the U. S. Department of Agriculture is a biological survey of Colorado, and it has this to say on the effect of physiographic and climatic features of Colorado on faunal and floral distribution: "Altitudinal variation in Colorado has a pronounced effect upon both temperature and moisture. As temperature is a very important factor in the distribution of life, Colorado is an exceptionally favorable field for illustrating vertical distribution. The wide range of elevation furnishes favorable conditions for characteristic species of five of the seven major-life zones of North America."

THE MOST COMMON BIRDS OF DENVER

For others, less common, see *The Birds of Denver, An Annotated List*, by W. H. Bergtold.

Dr. Bergtold says: "The situation of, and the conditions about Denver, make it a peculiarly interesting place for the study of Western bird life; its geographical location makes it possible to see within its boundaries species and subspecies usually restricted to Eastern, Western, or Southern Faunae, the City of Denver being at the overlapping edges of these four characteristic bird regions."

PERMANENT RESIDENTS.

House Finch—"our characteristic native city birds."
Flicker.
English Sparrow,
Magpie.
Desert Horned Lark.
Ring-necked Pheasant.

WINTER RESIDENTS.

Pink-sided Junco, and other Juncos.
Rocky Mountain Creeper.
Long-tail Chickadee.
Long-crested Jay.
Tree Sparrow.

COMMON DURING MIGRATION AND TRANSIENT VISITORS.

Ducks—Mallard, Shoveler, Redhead.
Hawks—Marsh, Sharp-shinned.
Long-eared Owl.
Prairie Falcon.
Bronzed Grackle.

SUMMER RESIDENTS.

Killdeer.
Western Mourning Dove.
Desert Sparrow Hawk.
Burrowing Owl (in suburbs).
Say's Phoebe.
Rock Wren.
Woodpeckers—Rocky Mountain Hairy, Red-headed.
Western Nighthawk.
Kingbird.
Brewer's Blackbird.
Yellow Warbler.
Western Warbling Vireo.
Black-headed Grosbeak.

Bullock's Oriole.

Western Lark Sparrow.

Western Chipping Sparrow.

Western Mockingbird (irregular summer visitant).

The following are summer residents, but some may be seen all winter :

Yellow-headed Blackbird.

Red-wing Blackbird.

Western Meadowlark.

Western Robin.

Rocky Mountain Bluebird.

WILD FLOWERS

BUTTERCUP FAMILY.

Monkshood.

Blue and Red Columbine.

Larkspur.

Anemone (Wind Flower).

Trailing Buttercup.

Pasque Flower.

YUCCA FAMILY.

Yucca or Soapweed.

VIOLET FAMILY.

Yellow Violet.

Prairie Violet.

CAPER FAMILY.

Rocky Mountain Bee Plant (Cleome).

MUSTARD FAMILY.

Wall Flower.

Golden Whitlow.

OXALIS FAMILY.

Wood Sorrel.

MALLOW FAMILY.

Rose Mallow.

Poppy Mallow.

SPURGE FAMILY.

Snow-on-the-Mountain.

GERANIUM FAMILY.

Cranesbill.

HEATH FAMILY.

Kinnikinic.

GENTIAN FAMILY.

Fringed Gentian.

Prairie Gentian.

Blue Gentian.

POTATO FAMILY.

Purple Ground Cherry.

Buffalo Bur.

MORNING GLORY FAMILY.

Bush Morning Glory.

PHLOX FAMILY.

Trumpet Phlox.

BORAGE FAMILY.

Chiming Bells.

Forget-me-not.

SNAPDRAGON FAMILY.

Painter's Brush.

Butter and Eggs.

Penstemons, Dark and Blue

Scarlet Bugler.

Blue Beardtongue.

MINT FAMILY.

Brook Mint.

Horse Mint.

ROSE FAMILY.

Wild Rose.

Gold Cup.

Cinquefoil.

PEA FAMILY.

Golden Banner.

Silvery Lupine.

Prairie Clover.

Sweet Pea.

Purple Vetch.

Loco.

Alfalfa.

Prairie Pea.

SAXIFRAGE FAMILY.

Wild Gooseberry.

EVENING PRIMROSE FAMILY.

Fireweed.

Evening Primrose.

MENTZELIA FAMILY.

Evening Star.

CACTUS FAMILY.

Prickly Pear.

Purple Cactus.

PARSLEY FAMILY.

Mountain Parsley.

HONEYSUCKLE FAMILY.

Twin Flower.

Snowberry.

BLUEBELL FAMILY.

Purple Bellflower.

Harebell.

ASTER FAMILY.

Blue Lettuce.

False Dandelion.

Goatsbeard.

Rose Thistle.

Goldenrod.

Daisy, Purple.

Purple Aster.

Gum Weed.

Column Flower.

Black-eyed Susan.

Sunflower.

Gaillardia.

LILY FAMILY.

Sand Lily.

Wild Onion.

Red Lily.

Mariposa Lily.

SPIDERWORT FAMILY.

Spider Lily.

IRIS FAMILY.

Blue Flag.

Blue-eyed Grass.

TREE LIST

NATIVE TREES OF COLORADO.

1. Deciduous.

Cottonwood.

Box Elder.

Willow.

2. Evergreens of Colorado (all coniferae).

a. Pines.

Foxtail Pine.

Timber Pine.

Yellow or Bull Pine.

White or Lodge.

Pinyon Pine.

b. Spruces.

Colorado Blue Spruce or Silver Spruce.

Engelmann Spruce.

c. Firs.

Douglas Fir.

Alpine Fir or Balsam Fir.

White Fir.

d. Junipers and Cedars.

Utah Juniper.

Rocky Mountain Red Cedar.

One-seeded Red Cedar.

(NOTE: The most helpful study on Evergreens of Colorado is by Dr. Longyear, of Colorado State Agricultural College.)

TREES WHICH HAVE BEEN INTRODUCED.

Ashes.

Birches.

Buckeye.

Catalpa.

Elms.

Hackberry.

Horse Chestnut.

Linden.

Locusts.

Maples.
Mulberry.
Oaks.
Olive, Russian.
Poplars.
Sycamore.
Walnut.
Wild Cherry.
Willows.

Many of these varieties may be found on private grounds; Fairmount Cemetery and the Capitol Grounds have more varieties than City Park. A diagram of Capitol Grounds, showing location of trees, may be found in "Trees and Peaks," by Eva Bird Bosworth. "The Capital City of Colorado has become a private forestry experiment station."—Enos Mills.

MAMMALS.

Whitefooted Mouse.
Harvest-Mouse.
Wood Rat.
Pocket Gopher.
Black-tailed Jack Rabbit.
Bailey Cottontail.
Long-tailed Skunk.
Spotted Skunk.
Prairie Dog.
Coyote.
Swift Fox.
Badger.
Ferret.
Weasel.
Long-eared, Hairy-lipped, Say, and Brown Bats.
Chipmunk.
Rock Squirrel.
Ground Squirrel.
Beaver.
Muskrat.

REPTILES AND BATRACHIANS.

Rattlesnake.
Bull Snake.

Blue Racer.
Hog-nosed Snake.
Lizards—Horned Toad and Sand Swift.
Toad.
Frog.
Salamander.

FISH.

Trout.
Grayling.
Whitefish.
Bass.
Catfish.
Sunfish.
Perch.
Wall-eyed Pike.
Darter.
Minnows.
Sculpin.

STATE CODE

PROTECTION OF BIRDS

It shall be unlawful for any person at any time within the corporate limits of the City and County of Denver to frighten, shoot at, wound, kill, take, capture, ensnare, net, trap or in any other manner molest or injure any robin, lark, whippoorwill, finch, sparrow, thrush, wren, martin, swallow, snowbird, bobolink, red-winged blackbird, crow, raven, oriole, kingbird, mocking-bird, song-sparrow or other song bird or insectivorous bird; or in any manner molest or injure the nest, eggs or young of any such bird, or have in possession the nest, eggs, young or body of any such bird. Any person violating the provisions hereof, upon conviction, shall be fined in a sum not less than one dollar nor more than fifty dollars for each offense.

GAME AND FISH LAWS OF COLORADO AS AMENDED IN 1917.

Section 2759:

It shall be lawful to pursue, take or kill, during the open season therefor, in the manner, of the kind, and for the purpose and to the number and extent in this division provided, the following game and fish, and the open season therefor in each year shall begin and end as hereafter provided, both dates inclusive, namely:

First. For deer having horns with two or more points on each horn, October 1 to October 4, commencing in 1918.

Second. For male mountain sheep having horns, September 25 to September 30, commencing in 1924.

Third. For male antelope having horns, September 25 to September 30, commencing in 1924.

Fourth. For elk having horns, November 1 to November 5, commencing in 1924.

Fifth. For prairie chickens, mountain and willow grouse, September 15 to October 1.

Sixth. For sage chickens, August 15 to September 1.

Seventh. For pheasants and other grouse indigenous to this state, September 1 to September 20, commencing 1924.

Eighth. For ducks, geese, brants, swans, plovers, and other wading, marsh and shore birds and water fowls and for yellow-legged snipes, September 16 to December 31.

Ninth. For doves, from August 15 to September 1.

Tenth. For bob white quail, October 1 to October 20, commencing in 1924.

Eleventh. For crested quail, October 1 to October 30, commencing in 1924.

Twelfth. For rabbits and hares, no closed season.

2759 A. The open season in running streams for trout and grayling, not less than 7 inches in length, shall begin May 25 and end October 31, and the open season for trout and grayling in lakes at an altitude not to exceed 7,500 feet shall begin May 1 and end October 31. And in lakes at an altitude over 7,500 feet, from June 15 to October 31.

The open season for white fish, bass, cat-fish, sunfish, perch, and wall-eyed pike shall begin May 25 and end October 31.

No fishing shall be done between the hours of 8:30 o'clock p. m. and 4 o'clock a. m.

2759 b. The right given by this division is limited to food purposes, and to the number of birds and fish, and pounds of fish, as hereinafter provided as follows:

Prairie chickens, mountain and willow grouse and such chickens, 10 birds in any one day, and not more than 15 in possession at any one time.

Ducks, geese, brants, swans, plover and other wading, marsh or shore birds, not more than 20 birds of one kind, or in the aggregate of all kinds, in any one day, and not more than 35 in possession at any one time.

And the right herein given to take fish is limited to any one calendar day not to exceed 15 pounds, and no person shall have in his possession more than 20 pounds of fish at one time.

Nor shall any person take or kill or have in his possession more than one deer in any open season, and no person under the age of 18 years be permitted to hunt big game under the provisions of this act, nor shall any person under 12 years of age be entitled to hunt except on his own premises or those of a parent or guardian, or take, kill or have in his possession more than half the number of birds or half the number of weight of fish as herein provided.

BIRDS

From Mrs. Sherman's Circular Letter on Conservation

Federal Migratory Bird Law

The conservation of bird life is one of the necessities of the day. We easily recognize their esthetic influence and their sentimental charm, but comparatively few appreciate their great economic value. Crops, fruit and trees are constantly preyed upon by insects. In the United States, insects cause a loss to agriculture of more than half a billion dollars each year. Birds, more than any other agency, hold these pests in check.

This enormous annual loss shows that we do not now have birds enough. The necessity is plain, therefore, of protecting those we have and thus giving them a chance to increase. By the conservation of bird life, we increase the productivity of the earth. This in turn helps to decrease the cost of living.

By the passage of the new Federal Migratory Bird Law the government now protects our migratory birds, largely the insectivorous and rodent-eating birds, about 600 species, from their human enemy at all times. The new law is so comprehensive and adequate that the extinction which threatened every wild bird in the United States is now averted and the birds that remain have a good chance of substantial increase.

Nevertheless, the battle to save the birds is yet to be won. For the fate of the birds depends upon the general enforcement of the new law. And the enforcement of every law depends upon public opinion. The new law being revolutionary in its character and from its nature difficult of enforcement, needs the loyal support of all good citizens.

Federation women everywhere should watch the local situation as to the enforcement of the law. Sportsmen should be urged to show good sportsmanship. The market hunter and the pot hunter should be suppressed. The legislature of the state should be called upon to make the state game laws conform with the regulations of the new federal statute.

The United States Department of Agriculture invites the co-operation of bird lovers in compiling a census of all the birds in the United States, to be begun in May and finished by the end of June. For particulars address the Biological Survey, Department of Agriculture, Washington, D. C.

The protection of wild animal life is another phase of con-

servation that should receive educational and legislative attention. A live beaver or deer or mountain sheep is of more value to us than a dead one. Protected by reasonable laws supported by public opinion, most forms of wild animal life will increase. Most of them are now threatened with extinction. See that the laws of your state give this wild life a chance to survive.

BIRD STUDY

The importance and value of birds in the economy of nature should be taught all children. Interest them by feeding the birds, and giving them water, especially in winter. Build bird houses and learn about the different species of birds in your locality. Organize bird classes and clubs for the children and they will quickly develop a keen interest and eagerly work to protect the birds from their many enemies. This teaching should have a place in every school.

Valuable assistance is now being given in this work by the National Association of Audubon Societies. It issues a leaflet to "teachers and others who are interested in giving instructions to children on the subject of birds and their usefulness." Directions are given for class organization, and how to obtain for each member a set of ten colored pictures, together with the outline drawings and descriptive leaflets. Write to Mr. T. Gilbert Pearson, Secretary of the National Audubon Societies, 1974 Broadway, New York, N. Y., for this leaflet of information and begin at once. Your children, as well as the birds, will be benefited by this study of the birds. The children must obey the new Federal Migratory Bird Law and they might better obey it intelligently and willingly.

Within the last few years several bird sanctuaries have been created. Many more are needed. Every state should have at least one of these harbors of safety for migratory birds.

WOMEN, BIRDS AND MILLINERY

With the women rests the responsibility of the killing of birds for millinery purposes. The sale of aigrettes is now prohibited by law in the United States. This is a great step in advance, but we need to go still farther. Women should not wear the feathers of any birds. There are plenty of ways to adorn a hat without killing a bird for its feathers. It is a well-known saying that "The two worst enemies of the birds are women and cats." The single exception to make in the use of feathers is the ostrich feather. There is no loss of life or even cruelty in connection with the production

of these feathers and everyone recognizes them at sight. All other feathers are open to suspicion. They may be only chicken feathers, or they may be feathers of birds that have been killed for the purpose. Only an expert can tell.

Let the women of the General Federation set the example and, with the exception of ostrich, refuse to wear feathers of any kind.

We are teaching our children to care for and protect the birds—all birds; we are working for the enforcement of the Federal Migratory Bird Law, and if we continue to adorn our hats with these very birds, we are certainly absurdly inconsistent.

PROGRAM

VALUE AND PROTECTION OF BIRDS—

Esthetic value.

Economic value.

Educational stimulus of bird study.

Bird plumage, its wearing condemned.

Effect of the new Federal Migratory Bird Law.

EDUCATIONAL INFORMATION CONCERNING BIRDS—

Insectivorous birds.

Migratory birds.

Bird reservations.

How can your state laws for the protection of wild birds and game life be improved.

BIBLIOGRAPHY

Bird and Wild Animal Life

BIRD LORE—A Magazine—D. Appleton & Co., New York.

HOW TO ATTRACT THE BIRDS—*Neltje Blanchan*—Doubleday, Page & Co.

FIRST BOOK OF BIRDS—*Olive Thorne Miller*.

HAND BOOK OF BIRDS OF EASTERN NORTH AMERICA—*Frank W. Chapman*.

WILD THINGS—*H. K. Job*—Houghton, Mifflin & Co.

BIRD GUIDE, EAST OF THE ROCKIES—*C. A. Reed*—Doubleday, Page & Co.

WESTERN BIRD GUIDE—*C. A. Reed*—Doubleday, Page & Co.

SOME COMMON BIRDS IN THEIR RELATION TO AGRICULTURE (Farmers' Bulletin 54), NATIONAL RESERVATION FOR THE PROTECTION

OF WILD-LIFE (Biological Survey Circular No. 87), BIRD HOUSES AND HOW TO BUILD THEM (Farmers' Bulletin 609), and many other bulletins of useful information may be had from the U. S. Department of Agriculture. Address, Secretary of Agriculture, Washington, D. C.

IN BEAVER WORLD—*Enos A. Mills*—Houghton, Mifflin & Co.

WILD ANIMALS I HAVE KNOWN—*Ernest Thompson Seton*—Scribner's.

WILD ANIMALS AT HOME—*Ernest Thompson Seton*—Doubleday, Page & Co.

THE KINDRED OF THE WILD—*Chas. G. D. Roberts*—L. C. Page & Co.

WILDERNESS WAYS—*Rev. W. J. Long*—Ginn & Co.

BIRD AND WILD ANIMAL LIFE—*Dr. Wm. T. Hornaday*.

VANISHING WILD LIFE—*Dr. Wm. T. Hornaday*.

AMERICAN NATURAL HISTORY—*Dr. Wm. T. Hornaday*.

WILD LIFE CONSERVATION IN THEORY AND PRACTICE—*Dr. Wm. T. Hornaday*.

(NOTE: Mrs. Philip B. Stewart, 1228 Wood Ave., Colorado Springs, Colorado, is the Chairman of the Bird Committee and will direct the work of this division. Write to her for information.)

LIST OF NATIONAL BIRD RESERVATIONS TO MARCH 4, 1913

Arranged Alphabetically

Aleutian Islands, Alaska.	East Park, Cal.
Belle Fourche, S. D.	East Timbalier, La.
Bering Sea, Alaska.	Farallon, Cal.
Bogoslof, Alaska.	Flattery Rocks, Wash.
Breton Island, La.	Forrester Island, Alaska.
Bumping Lake, Wash.	Gravel Island, Wis.
Carlsbad, N. M.	Green Bay, Wis.
Chamisso Island, Alaska.	Hawaiian Islands, Hawaii.
Chase Lake, N. D.	Hazy Islands, Alaska.
Clealum, Wash.	Huron Islands, Mich.
Clear Lake, Cal.	Indian Key, Fla.
Cold Springs, Ore.	Island Bay, Fla.
Conconully, Wash.	Kachess, Wash.
Copalis Rock, Wash.	Keechelus, Wash.
Culebra, P. R.	Key West, Fla.
Deer Flat, Idaho.	Klamath Lake, Ore.
Desecheo Island, P. R.	Loch-Katrine, Wyo.

Malheur Lake, Ore.	St. Lazaria, Alaska.
Matlacha Pass, Fla.	Salt River, Ariz.
Minidoka, Idaho.	Shell Keys, La.
Mosquito Inlet, Fla.	Shoshone, Wyo.
Niobrara, Neb.	Siskisit, Mich.
Palma Sola, Fla.	Strawberry Valley, Utah.
Passage Key, Fla.	Stump Lake, N. D.
Pathfinder, Wyo.	Tern Island, La.
Pelican Island, Fla.	Three Arch Rocks, Ore.
Pine Island, Fla.	Tortugas Keys, Fla.
Piskun, Mont.	Tuxedni, Alaska.
Pribilof, Alaska.	Willow Creek, Mont.
Quillayute Needles, Wash.	Yukon Delta, Alaska.
Rio Grande, N. M.	

NATIONAL ASSOCIATION OF AUDUBON SOCIETIES

Special Leaflet No. 22 (8th Edition—Year 1918-1919)

AN ANNOUNCEMENT TO TEACHERS

The National Association of Audubon Societies is able to make the following offer of assistance for the present school year (1918-1919), to those teachers and others in the United States and Canada who are interested in giving instruction to children on the subject of birds and their usefulness:

JUNIOR AUDUBON CLASSES

To form a Junior Audubon Class for bird-study, a teacher should explain to the pupils of her grade (and others if desired) that their object will be to learn all they can about the wild birds, and that everyone who becomes a member will be expected to be kind to the birds and protect them. Every member will be required to pay a fee of ten cents. When FIFTEEN or MORE have paid their fees, the teacher will send their money to the National Association of Audubon Societies and give the name of the Audubon Class and her own name and address. CHILDREN MUST NOT SEND IN FEES INDIVIDUALLY. The Association will then forward to the teacher (or person organizing the class) for each member whose fee has been paid the beautiful Audubon Button, and a set of eight colored pictures of common birds, together with accompanying Educational Leaflets containing accounts of the habits of the birds and an outline drawing of the pictures for color

work. Each child also receives one of the "Audubon Cases," giving pictures in colors of more than sixty birds.

(SPECIAL NOTE: Every teacher who forms a class of fifteen or more receives a free subscription to the magazine, "*Bird-Lore*," which contains many valuable suggestions for teachers. This does not mean that we give "*Bird-Lore*" for *EVERY FIFTEEN PUPILS, BUT FOR EVERY CLASS OF NOT LESS THAN FIFTEEN PUPILS. ONLY ONE SUBSCRIPTION IS GIVEN NO MATTER WHAT THE SIZE OF THE CLASS, FIFTEEN BEING THE MINIMUM.* It is expected that the teacher will give at least one lesson a month on the subject of birds, for which purpose she will find the leaflets of great value as a basis for the lessons.

When extra leaflets are wanted they must be ordered by marking the Blue Price List, dated and signed at the bottom. These



leaflets are three cents each. Communications regarding change of address, etc., should be sent to 1974 Broadway, New York City.)

BY-LAWS FOR AUDUBON CLASS

If the teacher wishes, the Audubon Class may have a regular organization, and a pupil may preside upon the occasions when the class is discussing a lesson. For this purpose the following set of by-laws is suggested:

Article I. This organization shall be known as the "..... Junior Audubon Class."

Article II. The objects of its members shall be to learn all they can about the wild birds, and to try to save any from being wantonly killed.

Article III. The officers shall consist of a President, Secretary and Treasurer.

Article IV. The annual fees of the Class shall consist of 10 cents for each member; and the money shall be sent to the National Association of Audubon Societies in exchange for Educational Leaflets and Audubon Buttons.

Article V. The Junior Audubon Class shall have at least one meeting every month.

Although most of these Classes have been and will probably continue to be formed among pupils in schools, anyone may form a Class of children anywhere, and receive the privileges offered.

SUBJECTS TO STUDY

Besides the study of the particular birds in the leaflets, the following subjects may be studied with profit:

BIRDS' NESTS—In the fall, after all the birds have left their nests, the nests may be collected and brought to the school-room. Study them and learn that the Chipping Sparrow's nest is made of fine rootlets, grasses, and is lined with horsehair; examine the mud cup of the robin's nest, the soft lining of the Shrike's nest, etc.

FEEDING BIRDS—In winter arrange "bird-tables" in the trees and by the windows, and place crumbs and seeds on them; in summer put out bathing and drinking pans, note what birds come to them and how frequently, and report what you observe to the Class.

NESTING-BOXES—In early spring put up nesting-boxes for Bluebirds, Wrens, Chickadees, Nuthatches, Martins and other birds. The leaflets sent will be found to contain many suggestions about bird-feeding and nesting-boxes, and the proper way to make and place the latter.

COLORING OUTLINES—The children, using crayons or water-color paint, may place the natural colors of the birds upon the outline drawings provided, using the colored plates for comparison. This is one of the best ways to fasten in the memory the appearance of the birds, and so learn to recognize them quickly in the field. Many teachers have utilized this feature as an exercise for the regular drawing-hour.

(Form for reporting the organization of a Junior Audubon Class.)
T. Gilbert Pearson, Secretary,

National Association of Audubon Societies,
1974 Broadway, New York, N. Y.

Dear Sir:

With this I enclose \$. in payment of the fees of
members of the Junior Audubon Class, which was
formed at, State of, on
. 191

You may send Audubon Buttons, Leaflets and "*Bird-Lore*"
to the following address:

Teacher.

P. O. Address
Express Office

Have you previously formed a class under this plan? $\left\{ \begin{array}{l} \text{Yes.} \\ \text{No.} \\ \text{When?} \end{array} \right.$

[NOTE: No foreign postage stamps, no foreign money, and
no checks under \$2.00 (unless accompanied by exchange) will be
accepted.]

NOTICE

The following material will be issued. Each child who pays
the fee of ten cents will be entitled to a selection of EIGHT SUB-
JECTS from the 20 listed below AND ONE of the four Audubon
Cases. If any of the leaflets or Cases become exhausted we reserve
the right to substitute for any of the material selected. The teacher
may also receive a set for ten cents:

1. Audubon Button, showing a Robin in colors.

2. Pictures, leaflets and outline drawings of EIGHT SUB-
JECTS from following list: Bald Eagle, Flisker, Cardinal,
Meadowlark, English Sparrow, Scarlet Tanager, Purple Martin,
Chipping Sparrow, Kingbird, Redstart, Bobolink, Barn Swallow,
Cedar Waxwing, Towhee, Junco, Nighthawk, White-throated Spar-
row, Downy Woodpecker, Snowy Egret and Phoebe.

3. ONE of the following Audubon Pocket Bird Collections:
Case No. 1, "Permanent Resident and Winter Visitant Land Birds
of the Northeastern States." Case No. 2, "Permanent Resident and
Winter Visitant Land Birds of the Southeastern States." Case
No. 3, "Early Spring Migrant Land Birds of the Eastern States."
Case No. 4, "Common Winter Land Birds of the Western States."

Other leaflets may be purchased from our blue price list at *three cents* each when five or more are ordered at one time. Audubon Collection Cases not ordered with the regular Junior set are sold at *ten cents a copy*. A complete list of the leaflets will be given on request.

ENDORSEMENT BY THE UNITED STATES COMMISSIONER OF EDUCATION

"I consider the work of the Junior Audubon Classes very important for both educational and economic results, and I congratulate you upon the opportunity of extending it. The bird-clause in the Mosaic Law ends with the words, 'That it may be well with thee, and that thou mayest prolong thy days.' The principle still holds. I hope that through your efforts the American people may soon be better informed in regard to our wild birds and their value.

Yours very truly,

P. P. CLAXTON,
Commissioner."

WASHINGTON, September 19, 1912.

BOOKS AND SUPPLIES

Teachers will find the following publications very helpful:

"Audubon Bird Charts." Nos. 1, 2 and 3. \$1.50 each. These wall charts are sold separately. Illustrated descriptive circular sent on request.

"The Bird Study Book." By T. Gilbert Pearson. Postpaid, \$1.35. This new illustrated book "tells the things people want to know about birds."

"Stories of Bird Life." By T. Gilbert Pearson. Postpaid, 70 cents. Interesting experiences with wild birds told in story form.

"Tales from Birdland." By T. Gilbert Pearson. Postpaid, 70 cents. A new nature book by Mr. Pearson who knows how to tell a story in a way to captivate children. This book has been adopted as a supplementary reader in the New York City schools.

"Primer of Bird-Study." By Ernest Ingersoll. Price, 18 cents, \$1.50 a dozen. A simple account of the structure, adaptations and functions of birds.

Reed's Bird Guides. Cloth, \$1.00; leather, \$1.25. "Eastern Land Birds," "Eastern Water Birds," "Western Water Birds," "Butterflies," etc.

Bulletin No. 1 "Attracting Birds About the Home." Postpaid, 15 cents. Illustrated articles containing designs for bird-houses, bird-tables, etc.

“Field Observation Book.” Postpaid, 15 cents. Containing suggestions and blanks for recording notes on birds in the field. Pocket size, flexible.



MEADOWLARK

Order—PASSERES

Family—ICTERIDÆ

Genus—STURNELLA

Species—MAGNA MAGNA

National Association of Audubon Societies

THE MEADOWLARK

By T. Gilbert Pearson

THE NATIONAL ASSOCIATION OF AUDUBON SOCIETIES

Educational Leaflet No. 3

Uncle Pauldo was old, and black, and extremely lazy, but he was most entertaining to a certain boy of nine years who learned from him many things about birds and animals and "varmints." One day the boy went to the cotton-field with a message and met Uncle Pauldo at the big dead pine where he had just come for water. As he lifted the water-gourd to his lips, a Meadowlark sang cheerily from the fence a few rods away.

UNCLE PAULDO'S VERSION

"There now," exclaimed the old man, "do you know what de Ol' Fiel' Lark is hollerin'? You don't? Well, when he sing dat bird is sayin' 'Laziness will *kill* you.' "

Perhaps Uncle Pauldo spoke truthfully—I cannot say; but I do know that all through the years since that day whenever the boy has heard a Meadowlark sending its clear song ringing across the fields, to his ears those are the words it seems to say.

Of all the twelve hundred kinds of birds found in North America there are comparatively few whose notes people commonly translate into words. Who, for example, ever heard of a writer trying to state in English language what a Wren says in Wren language, or who will tell us in plain words what a Red-headed Woodpecker is talking about when he shouts to his mate from the old dead limb?

Among those birds, however, that are popularly supposed to say things one can understand is the Meadowlark, but, as usual, in similar cases all hearers do not agree as to what is the proper translation. Some New England people entertain the idea that the bird sings "Spring o' the Y-e-a-r!" While there are those in New Jersey to whose ear the song sounds like this: "I see y-o-u-u-u! You ca-a-a-n't see me-e-e-e!"

QUALITY OF THE SONG

Let it be borne in mind that this bird's song has a distinct quality about it that at once sets it off from the songs of any other denizen of the countryside. This much may be said of it for a certainty, that once heard distinctly it is not probable that one will fail to recall its author the next time its chime-like whistle comes

down on the wind. A young bird-student may at times be puzzled to distinguish between the song of the Red-eyed Vireo and that of the Robin, or may become confused in endeavoring to tell which of the Warblers is singing in the tree-tops near by, but to hear the Meadowlark at his best is to listen to a song that will ever afterward be known to him.

Like all singing birds, so far as my knowledge extends, the musical performances of this inhabitant of the open country begin with the day. At intervals until night the whistling melody continues. There is noticeable variation in the quality of the singing of different birds. Not all men can sing with the same degree of melody, nor can all Meadowlarks.

These birds are found from the southern prairie Provinces of Canada southward throughout the United States and into Mexico. They are more numerous, of course, in some regions than in others, but wherever found they are much in evidence, and are always known by the dwellers of the country round about. Few people can pass this yellow-breasted, black-bibbed, loud-singing musician without noticing its presence.

INCREASE IN NUMBERS

The Meadowlark is one of the species of birds that has increased in numbers since the coming of the white man to America. Vast areas of our country, particularly in the Eastern and Southern States, were originally covered with heavy forests. The Meadowlark being a bird of open lands, was therefore restricted to the comparatively few prairies that then existed. These conditions began to change as soon as the settlers commenced felling the forest trees, and as fields and meadows appeared Meadowlarks began to increase.

If you want to find a Meadowlark's nest, you must look for it on the ground. It is usually made entirely of dead grasses, although at times a thin lining of horsehair is added. Most of the nests I have examined possessed a dome-shaped roof of grass, thus allowing inspection from one side only. This snug little house is hid under the edge of a clump of grass or weeds. Sometimes one finds it in a field of corn, or concealed by a stump around which grass is growing, or elsewhere protected by an overhanging grassy clod left unbroken at the spring plowing.

HOME WELL HIDDEN

It is something of an adventure to find one of these stationary cradles built for the comfort of the wee Larks to come. Usually

it is discovered quite by accident as one pursues his way across a meadow or field. So closely do the colors of the feathers on the head and back of the bird resemble its surroundings that if it could restrain its fear one might pass within a foot of the spot with small chance of discovering the secret. The bird seems to be conscious of this fact, and often will permit one almost to step on it before fluttering away. One day, after a forenoon spent in a marsh with two other bird-lovers, we came out on the dry meadow-land for lunch. After spending half an hour lunching and lounging on the ground we rose to go, when suddenly up flew a Meadowlark from her nest with its five speckled eggs not over twelve feet from where our lunch had been spread. There she had been sitting all that time, and probably would not have moved when she did had I not stepped within a foot of her hiding-place.

It is a very discouraging task to attempt to find a Meadowlark's nest by watching the birds go to it, for the reason that when one of them wishes to approach the spot, it alights on the ground many yards away and walks quietly through the grass to its destination. Ordinarily it leaves its home in the same careful manner. Certain well-defined paths of travel may often be noted radiating from the nest.

There is a great difference in the length of time that the young of various birds stay in the nest. Baby Ducks, Quails, Killdeers, and Pheasants, as examples, can run about within a few hours after being hatched. It seems that about all one of these little fellows needs to do before starting in the race of life is to wait until his coat has dried and his small brothers and sisters have kicked themselves free from their shells. The nest is useful as long as he is an egg, but when he becomes a bird he must up and away a' once.

But how different all this is with a tiny Meadowlark, who comes into the world weak and helpless! Close to two weeks' time must pass before it is strong enough to follow its mother out among the waving grass-clumps and the towering weeds.

Late in the-summer the birds assemble and in more or less straggling companies go foraging about over the fields. Sometimes one may find only half a dozen together, but in crossing meadows I have at times seen fifty or a hundred at a time. They do not fly in compact flocks like Blackbirds, nor do all the members of a company spring into the air at once as is the custom with Quails.

Their flight is leisurely and rather slow, which renders them an easy mark for the amateur gunner.

NOT A GAME-BIRD

In many states Meadowlarks are protected by law, but over considerable areas of the southern part of our country the birds are still persistently shot for sport and for the small morsel of flesh to be found on their bodies. How can anyone enjoy shooting the life out of one of these beautiful guardians of the meadow? Think how devoid of all the finer feelings a man or boy must be who can experience a thrill of pleasure in seeing a song-bird fall torn and bleeding to the earth. I refuse to believe that of all the hundreds of thousands of Junior members of the Audubon Society in this country today there is one who, when he becomes a man, will shoot a Meadowlark.

Quite aside from the beauty of its song and of its plumage, this bird, by eating insects and weed seeds, is helping every farmer and gardner to raise his crops. Meadowlarks do extremely little damage to fruit or grain, and in many parts of the country they are never accused of doing any harm whatever. Now and then some of them get a few grains of corn or wheat, but they pay for this a thousand fold by the good services they render to the man who is trying to raise the corn or wheat.

WESTERN MEADOWLARK

Out on the plains of the far West, and along the Pacific Coast, there is found the Western Meadowlark. In appearance it closely resembles the eastern bird of the same name, but it is a far more famous singer. At times it appears to possess the wonderful powers of the ventriloquist. I remember one morning in north-eastern California when I vainly sought to see one of these birds, that sounded as though its song might be coming from some stake along a fence two hundred feet away. With my field-glass I swept the fence from right to left and back again. Over and over I did this, searching for the splendid musician whose song sounded again and again in the clear air; and then by accident I discovered the bird standing on a bush not twenty feet from me. These Western Meadowlarks often come into towns, and there make themselves quite at home. The first one I ever heard singing, indeed, was in a city, the city of San Diego, California. For ten minutes I harkened to its song as it stood on a telephone-pole, and all the while hundreds of people were passing.

CLASSIFICATION AND DISTRIBUTION

The Meadowlark belongs to the Order *Passeres*, Suborder *Oscines* and Family *Icteridae*. Its scientific name is *Sturnella magna magna*. Three geographical races are recognized in the United States, in addition to the eastern bird: Rio Grande Meadowlark (*Sturnella hoopesi*); Southern Meadowlark (*Sturnella m. argutula*); and Western Meadowlark (*Sturnella m. neglecta*). The Meadowlark breeds throughout the United States, in southern Ontario, and northwestward to the Saskatchewan Valley; and it winters wherever cold and snowfall are not severe.

(NOTE: This and other Educational Leaflets are for sale, at 2 cents each, by the National Association of Audubon Societies, 1974 Broadway, New York City. Lists given on request.)

PRELIMINARY OUTLINE FOR TWO-YEAR COURSE IN AGRICULTURE FOR RURAL SCHOOLS

FIRST YEAR

First Period

CROPS

1. What are the chief crops in the neighborhood?

Note: This can be brought out by consulting all the children in the class. It is sufficient to know that wheat, oats, barley, sugar beets, potatoes, corn, melons, apples, etc., be used to designate the different kinds of crops. After it has been definitely worked out what crops are chiefly grown in the community, the question should be asked:

Which crops are the best money makers for the community? Next,

What is the history of some of these crops?

A portion of the time devoted to geography, to history and to reading might well be applied in working out this phase of the subject. A type example may be used to illustrate the method. For example, take corn.

2. Where did corn originate? On what continent? In what country?

What varieties of corn are grown in the neighborhood? (If possible find out the history and origin of these varieties.)

How important is corn as a crop in the country as a whole?

What is corn used for? Human food, stock food, starch, corn oil, other products.

How is corn grown?

How is the land prepared for it?

Is it planted in rows and cultivated?

Why is it so planted?

How should the seed be cared for?

How deep should it be planted?

What time should it be planted?

How should it be cultivated?

What machines are used for planting and cultivating?

How is it harvested?

What becomes of it after it is harvested?

Trace the handling of corn put up for silage; corn cut and shocked for dry fodder; corn harvested for the grain alone.

How is the grain stored?

Which is the better method?

Trace the handling of corn for grain from the field to the corn crib, through the farm storage bin to the elevator. Show where it is shipped and how; show how it is handled on the market. Trace it to the feed lot and to the corn products manufacturers.

When should the seed be gathered?

How is corn improvement brought about by seed selection?

How is seed tested for germination?

Actually conduct germination tests.

3. In a similar way take up the study of small grains or some one of the small grains.

Make a study of the enemies which affect these crops. These enemies are both plant and animal. Some of them may be controlled.

Show how such diseases as smut in the small grains may be controlled by treating the seed.

Have actual demonstrations of methods in the school room.

Study some of the insect enemies that affect these crops, and show how they may be controlled.

Make similar studies on some one or more of the small grains to those outlined under the type example of corn.

Carry the crop from its origin, giving methods of seed selection and improvement, treatment of seed, depth to plant, method of planting, machinery used in preparing the seed bed, planting, harvesting and threshing after harvest. How to shock, stack, etc.

Follow the crop from the bins on the farm after threshing clear through the elevator, over the transportation systems, through the terminal markets, through the manufacturing processes until it reaches the per-

sons who consume the crop or the manufactured products from the crop.

WEEDS

4. What weeds grow in the community?

What is a weed?

Why do weeds reduce yields?

How do you kill weeds?

How are weeds which grow in the community propagated, by seeds or underground roots?

What are the easiest ways to keep weeds down?

Note: Rotation of crops, cultivated crops alternating with uncultivated crops, proper plowing, at what time, etc.

How do weeds scatter their seeds?

Note: Wind, irrigation water, birds, other animals, etc.

Second Period

ANIMALS

1. What kind of animals are kept in the neighborhood?

Why are horses kept? Mules? Hogs? Sheep? Beef cattle? Dairy cattle? Poultry?

What breeds of horses?

Where did these breeds originate and how?

How and when did they come to this country?

Which are the better breeds for the neighborhood?

Note: Much of the study in answering these questions could be taken up in connection with history and geography.

2. What kinds of cattle are grown in the neighborhood?

What is the difference between beef cattle and dairy cattle?

Which is the best breed of beef cattle for the neighborhood?

Why?

Where did the breed originate?

Who originated it?

What do the animals eat?

How should they be fed for best results for the neighborhood?

Note: Follow the history of one of the dairy breeds as it has been done for the beef breed.

3. Make milk tests for butter fat.

Note: If possible get tests from different cows to bring out

the idea of different value of different individual animals. It might be possible to organize the testing work so that the school could make tests for butter fat with a Babcock Tester for the cows of the neighborhood.

4. What birds are common to the community?

Which of these are beneficial? (That is, which of these eat insects that injure crops?)

Which of these birds are injurious? (That is, which of these eat crops without being helpful by eating insects which injure the crops?)

SECOND YEAR

First Period

SOILS

1. What is soil?

Note: Collect samples of the different kinds of soils in the neighborhood.

How did these soils originate?

What is soil good for? (Note: Grow plants.)

What kinds of soil plow easily?

What kinds plow with difficulty?

Note: These questions should develop the idea of light and heavy soils.

Why do some soils produce good crops and some poor?

Why is deep mellow soil more productive than shallow soil?

Why do crops do better under system of alternate cropping or rotation than they do under continuous cropping?

What is meant by seed bed?

What are the processes and machinery used in preparing seed beds?

Develop information on the movement of soil water.

How does cultivation save water?

How do weeds waste water?

Where does all the water come from that is found in ordinary soils?

How much water is needed to grow crops?

How much precipitation in the form of rain or snow does it take to make the water necessary to produce various sized crops?

What happens when there is too much water?

How is excess water removed by drainage?

What happens to crops where there is too little water?

How do they supply water by irrigation to make up deficiencies in the rainfall?

When is the land plowed in the neighborhood for different crops?

Is it plowed at the best time?

Second Period

FARM ACCOUNTS

1. Farming is a business. To know what the business is doing it is necessary to keep accounts. Any record kept of the business is an account. The best records are those which are simplest, as they are more easily understood, and if complete enough tell the whole history of the business.

2. The basis of any farm account is the inventory.

Teach how to take an inventory at the beginning and at the end of the year.

Have each pupil make an inventory of some special phase of farming business, if possible, taken from the farm from which he comes. One student could take the inventory of the machinery and make it complete; another might take an inventory of livestock; another might take an inventory of the grain or crops. On some of the smaller and simpler farms students might take a complete inventory of the whole farm. The inventory should be classified into land and what goes with it. That is, land and permanent buildings and other permanent improvements under the heading of "real estate." There should be classes in the inventory for machinery, for livestock such as horses, beef cattle, hogs, dairy cattle, poultry, crops, small tools, etc.

After experience with actually making an inventory the use of the inventory should be told.

OTHER RECORDS

An account should be kept with some of the individual enterprises of the farm. For example, assign some pupils to keep an account of dairy cows; others of chickens; others of hogs. Some might be assigned, at the proper season, to keep a record of a particular field or a particular crop. This record should show the

work done and when and its value; the expense incurred and the receipts accruing.

An account might be kept of parts of an enterprise. For instance, a complete record by one boy or girl of the plowing in a certain field; another might make a complete record of the planting; another of the harrowing or preparation of the seed bed between the plowing and planting.

These are simply suggestions as to possibilities in record keeping.

Records should be kept neatly and checked over. No record should be kept for which a use cannot be definitely shown.

Assistance might be rendered boys and girls for summer work such as garden club work, pig club work, feeding and care of poultry.

Some time might be expended in teaching children how to prepare and put on exhibits. As a development of this idea and to close it out small school fairs might be held and merits awarded. Properly designed ribbons or cards will serve as rewards of merit practically as well as prizes and will be valued by the boys and girls if the proper spirit is developed more than money or good prizes.

It is quite likely that at least in the second year the boys' and girls' work could and probably should diverge some, the girls taking up lines of domestic science or home arts and the boys continuing the agriculture.

FOLLOW THE PIED PIPER

Join the United States
School Garden Army.



SUGGESTIONS FOR GARDEN WORK IN THE PUBLIC SCHOOLS

The war by making food scarce has forced us to economize. At present a large part of the world population is not only not supporting itself but is actually dependent. This condition promises to continue for some time. It will take years after the war closes for Europe to approximate feeding herself as nearly as she did before this world tragedy. Money in the pocket will not put food in the stomach if the food does not exist. This deficiency must in large measure be made up in the United States. The demand is insistent and increasing, while at the same time the army and the factory are calling vast numbers of our men and boys from the farm and food-producing industries.

To meet the urgent need the children of the United States are asked to become gardeners and to make use of the back yards, vacant lots, and unused corners, as never before. Fortunately several organizations like the School Garden Ass'n of America, located at New York, and the Children's Flower Mission of Cleveland, and the Boys' and Girls' Club Movement, have prepared the way. And now the U. S. Bureau of Education, through the United States School Garden Army, has given national recognition to the work and will assist in the big American way. America has never been inattentive to the cry of the hungry. In the mighty effort to make food plentiful over all the earth she must do the major part, and the teacher and the pupil must do their share.

Gardening is naturally closely related to Nature Study. In fact the garden furnished a very appropriate field for the practical application of nature study instruction. The child gardener is compelled to observe soils, seeds, insects, weather, roots, winds, sunlight, shade, the growth and maturing of plants, effects of irrigation and methods of harvesting, curing and storage. The gardener is not only studying nature, but he aims to make nature his servant. In this effort the teacher can and should render great aid to the child.

. It is impossible to arrange a course of study that will fit all conditions and needs. Colorado extends through four degrees of latitude and her homes are found in altitudes varying from four thousand to ten thousand feet. Her plains section, mountain valleys, and mesas, present conditions so different and varying that

specific directions will be appropriate in but few cases. Hence what is given below will be quite general and the teacher will be expected to adapt the instruction to local needs.

During the fall months such subjects as fall planting, the storage, drying and preserving of vegetables and fruits, saving seeds for future use, and preparation of the soil for next season's garden, will naturally occupy the attention. Fortunately the U. S. Department of Agriculture and our Colorado Agricultural College have prepared and will furnish free for the asking numerous valuable bulletins dealing with these subjects. Many other subjects of related interests have been discussed in bulletin form and teachers should avail themselves of these free libraries of valuable and reliable information.

To assist those who do not have access to such sources a partial list is here given. If a U. S. publication is desired, write to the Department of Agriculture, Washington, D. C. If a Colorado pamphlet is wanted, send to the Colorado Agricultural College at Ft. Collins.

UNITED STATES PUBLICATIONS DEALING WITH VEGETABLE GROWING

Asparagus Culture	Farmers' Bulletin	61
Human Food from Acre of Staple Farm		
Products	Farmers' Bulletin	877
Cucumbers	Farmers' Bulletin	254
Onion Culture	Farmers' Bulletin	354
Cabbage	Farmers' Bulletin	433
The City and Suburban Vegetable Garden.....	Farmers' Bulletin	936
The Small Vegetable Garden.....	Farmers' Bulletin	818
The Farm Garden in the North.....	Farmers' Bulletin	937
Beans	Farmers' Bulletin	289
Tomatoes	Farmers' Bulletin	220
The School Garden	Farmers' Bulletin	218
Okra	Farmers' Bulletin	232
How to Grow an Acre of Corn	Farmers' Bulletin	537

COLORADO PUBLICATIONS

Home Vegetable Garden	Bulletin	241
Vegetable Growing in Colorado.....	Bulletin	199
Potato Culture in Colorado.....	Bulletin	243
Some Colorado Mushrooms	Bulletin	201
Beans in Colorado and Their Diseases	Bulletin	226

PUBLICATIONS DEALING WITH SMALL FRUITS

United States Government

Everlasting Strawberries	Farmers' Bulletin 901
Home Fruit Garden	Farmers' Bulletin 154
Raspberry Culture	Farmers' Bulletin 887

Colorado Agricultural College

Small Fruits for Colorado	Bulletin 195
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STORAGE, DRYING AND PRESERVING—FRUITS AND VEGETABLES

United States Government

Home Canning	Farmers' Bulletin 839
Drying Fruits and Vegetables in the Home.....	Farmers' Bulletin 841
Potato Storage and Storage Houses.....	Farmers' Bulletin 847
Home Storage of Vegetables	Farmers' Bulletin 879

Colorado Agricultural College

Farm Storage of Apples and Potatoes.....	Extension Bulletin 121
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PUBLICATIONS ON POULTRY

United States Government

Mites and Lice of Poultry.....	Farmers' Bulletin 801
Hints to Poultry Raisers.....	Farmers' Bulletin 528
Back Yard Poultry Keeping.....	Farmers' Bulletin 889
Poultry House Construction	Farmers' Bulletin 574
Poultry Management	Farmers' Bulletin 287
Natural and Artificial Incubation of Hens' Eggs	Farmers' Bulletin 585
Standard Varieties of Chickens.....	Farmers' Bulletin 806

Colorado Agricultural College

Poultry Management	Extension Bulletin 130
The Poultry House	Extension Bulletin 126
Poultry Raising	Bulletin 213

SEEDS AND SEED TESTING

United States Government Publications

Seed Corn	Farmers' Bulletin 415
Saving Vegetable Seeds for the Home and Market Garden	Farmers' Bulletin 884
Home Production of Onion Seed and Sets.....	Farmers' Bulletin 434
The Rag Doll Seed Tester.....	Farmers' Bulletin 948
Testing Farm Seeds in the Home and the Rural School	Farmers' Bulletin 428

Colorado Agricultural College

Cleaned, Treated and Tested Seed for Colorado.....Bulletin 238

BIRDS*United States Government Publications*

The English Sparrow as a Pest.....Farmers' Bulletin 493
 Bird Houses and How to Build Them.....Farmers' Bulletin 605
 Some Common Birds Useful to the Farmer.....Farmers' Bulletin 630
 How to Attract BirdsFarmers' Bulletin 760
 Fifty Common Birds of Farm and Orchard.....Farmers' Bulletin 513

INSECTS*United States Government Publications*

Aphids Injurious to Orchards.....Farmers' Bulletin 804
 The Common Cabbage Worm.....Farmers' Bulletin 766
 How to Detect Outbreaks of Insects and
 Save Grain CropsFarmers' Bulletin 835
 House Ants and How to Control Them.....Farmers' Bulletin 740
 Grasshopper ControlFarmers' Bulletin 223
 Control of Diseases and Insect Enemies of
 the Home Vegetable GardenFarmers' Bulletin 856

Colorado Agricultural College

Insects and InsecticidesBulletin 210
 Common Insects of the GardenBulletin 199

MISCELLANEOUS UNITED STATES GOVERNMENT PUBLICATIONS

How to Increase the Potato Crop by Spray-
 ingFarmers' Bulletin 868
 Cabbage DiseasesFarmers' Bulletin 925
 Organization of Boys' and Girls' Poultry
 ClubsFarmers' Bulletin 562
 The PeanutFarmers' Bulletin 431
 Weeds and How to Control Them.....Farmers' Bulletin 660

Colorado Agricultural College

Some Colorado MushroomsBulletin 201
 Hotbeds and Cold FramesBulletin 221
 Reports and Plans of City Garden Clubs.....Extension Bulletin 133

The above list is not complete, but it will give the teacher an introduction to much valuable information. Most of the Farmers' Bulletins are sent free on request, but in some cases a small charge

is made. It will be worth while to ask the Superintendent of Documents, Washington, D. C., to send you price lists of the government publications. The Colorado Agricultural College will be glad to send lists of their publications. The National War Garden Commission, Maryland Bldg., Washington, D. C., have issued some most excellent bulletins, which they send on request.

The Extension Department of the International Harvester Co., Harvester Bldg., Chicago, Ill., publish a number of very fine bulletins strikingly and attractively illustrated. They send these for about the cost of postage. They will send you a price list on request.

Many excellent books have been published. A few are named here:

Principles of Vegetable Gardening, by Barley-MacMillen Co., Chicago.

Vegetable Gardening, by Watts Orange Judd Co., Chicago.

Productive Vegetable Growing, J. B. Lippincott & Co., Philadelphia.

School and Home Gardens, by Meier, Ginn & Co., Chicago.

Vegetable Gardening, by Green, Webb Publishing Co., Minneapolis.

Practical School and Home Gardens, by Hood, Long & Co., Lincoln, Neb.

The months of September and October are favorable for the study of insect life. This is a subject in which children find keen pleasure. Unfortunately, too, the general public are woefully lacking in information on this line.

In a general way the uninformed individual considers all insects injurious to his garden. Usually he has heard in a hazy way that the lady bird beetle is helpful in destroying other insects, but very few people recognize this beneficent little creature in its larva form, and so destroy it in its most useful stage.

There are a number of other insects helpful because they feed on bugs, lice, eggs, etc., and so help protect the garden. Among these may be mentioned the beautiful golden-eyed, lace-wing fly, with its curious stilt-like eggs; the ichneumon fly, with its four-inch long ovipositor; the braconids that parasitize plant lice; the beautiful tiger beetles with their shiny metallic coats, and the dragon flies, sometimes called mosquito hawks, because they feed on those irritating pests. There are many others whose names and habits we ought to know.

Butterflies are generally looked upon as harmless, but in

the larva form many of our butterflies and moths are quite destructive to vegetation. The cabbage butterfly, the eight-spotted forester whose larva feeds on the grapevine and the virginia creeper, the tomato sphynx, the cut worm moth, the black swallow-tail whose curious larva feed on celery and related plants, and the leaf-roller moths, whose young are so destructive to the leaves of trees and shrubbery, are common examples. As soon as one begins to study, he is astonished at the number and variety of insect pests.

Children are always interested in these life forms and it is regrettable that more teachers and parents are not able to answer their questions concerning them. Ask the children to look in the large dictionary for the distinction between a bug and a beetle, and a moth and a butterfly. In the back part of Webster's International Dictionary, among the pictures, is an alphabetically arranged list of insects that teachers will find very helpful. The list of birds, animals, and fishes also found there, should have a better use than simply to amuse the pupils. The Century Dictionary is especially good for its pictures and descriptions of insect life.

Children will take much pleasure in helping make a collection of garden insects for the school and in observing and learning about the life histories of the insects found. In a large way the study of insects in Colorado is an unexplored country and there are many opportunities for the young naturalist to present new facts and unrecognized species to the scientific world.

Small insects as bugs, beetles, flies, and the like, can be preserved in small bottles filled with a weak solution of formaldehyde. Two teaspoonfuls of this liquid in a teacup of water makes a good preserving fluid. The small clear glass vials such as physicians use are excellent for holding insects preserved in formaldehyde.

Butterflies, moths, and the larger insects may be killed with cyanide, benzine, or even gasoline, and then mounted for exhibit purposes. A mounting board can be easily and cheaply made. If the teacher has never seen such a board, perhaps some teacher in a nearby high school can show how to make one.

The fall is a good time for the collection and study of seeds. A glass test tube filled with successive layers of different kinds of seeds makes a curiosity that children will like to look at. If different shapes and colors are placed adjacent they will add to the oddity of the collection. A dozen varieties of beans make a

fine showing when thus arranged. Corn, the various cereals, and the varieties of vegetable seeds, can be exhibited and studied in this way very nicely.

Small clear glass bottles can be used for holding samples of soil, loam, sand, gravel, clay, adobe, and the like. The bottles when corked keep the samples looking fresh and are very convenient for observation and study in class. If a microscopic examination or the feel of the soil is desired, a small amount may be taken from a bottle without disturbing the rest.

If experiments with different kinds of soil are undertaken, larger amounts will be necessary. Books on agriculture suggest a number of interesting tests with soil that require the use of numerous bottles, lamp chimneys, tumblers, and the like. If one has the apparatus, he should use it by all means. But by molding the soil into the form of a bird's nest and carefully pouring into the nest a small quantity of water and noting whether the water soaks away quickly or slowly, much can be learned without the bottles and lamp chimneys. The child who has made mud pies will be quite enthusiastic about getting things ready for such an experiment.

A very interesting test can be made by using two jars or crocks about five inches across and seven or eight inches deep. The jars should have the same shape and should weigh exactly alike. They should be filled with the same amount of soil by weight, and the soil packed closely. Into each pour the same amount of water by weight. Let them stand for a week or ten days, leaving one untouched and stirring thoroughly about two inches of the top soil of the other every day. Now on the theory that cultivation prevents evaporation there should be considerable difference in the weight of the jars. Put them on the scales and see how theory and fact compare. Many other experiments will suggest themselves if teacher and pupils enjoy such tests.

In the early fall a garden exhibit held at the school is thoroughly enjoyed by the pupils and has high educational value. This is a very effective way of establishing correct ideas and standards of prize-winning vegetables. Even if it is not convenient to hold an exhibit, children may be asked to bring to school choice examples of the various types of garden produce. They will quickly learn what are the qualities which make an ear of corn a prize winner. They will observe that proper shape and smoothness are worth more in a potato than just size and weight. They will soon note that there are different types of po-

tatoes, a prize Early Ohio being oblong, a Peachblow more nearly round, while a Burbank should be about twice as long as it is wide. There are well recognized standards of excellence for carrots, beets, cabbage, tomatoes, and the like, about which most of our teachers can easily inform themselves and be very helpful to their school and community by passing the information along.

In the spring garden planning should begin early. In February get catalogs of reliable seed houses and make lists of what you need. Plan your garden and decide how many feet of rows of each vegetable you are going to have. The numerous tables furnished in seed catalogs and garden books will then tell how much seed is needed. Fruit and shade trees may be trimmed in February except the maple and early flowering shrubs. Seed testing should begin early. Teachers should know how to use a plate tester or a rag baby. Send for the bulletins on these subjects.

The proper time of planting will vary with the latitude and the altitude. The dates suggested here are suited to Denver conditions. A difference of a hundred miles north or south, or a thousand feet in elevation will usually make a week's difference in the planting time. But the shelter or exposure afforded by mountain ranges has to be considered as well.

The early part of March is a good time for indoor planting of cabbage, cauliflower, celery, and onions. The seed of asters, pansies, verbenas, giant cosmos, and the like, can be started in flats at this time. Sweet peas can be planted outside any time after the middle of the month.

The earlier a garden is plowed or spaded after the soil is in condition to work, the better. But it should be raked thoroughly immediately after being turned over so as to break up the clods. This is entirely different from fall plowing where the ground is left rough.

In the latter part of March start indoors tomatoes, peppers, egg plants, and the like. Remove mulching from beds and shrubs unless the season is unusually late. Late March is the right time to set hens if there is a place to take care of the little chicks in the stormy months of April and May.

In April, as soon as the soil and season are favorable, sow outside all the hardy vegetables and flowers. The following list is considered hardy: beets, Brussels sprouts, cabbage, carrots, cauliflower, celeriac, celery, cress, endive, kale, kohlrabi, peas, potatoes, radishes, salsify, spinach, and turnips. Usually the class is printed on the seed packet.

If the season is early, cabbage, cauliflower and onions can be transplanted outside in the latter part of April. Trees and shrubbery can be set out now, but all such work should be completed by early May.

Tomatoes, egg plants, and other tender plants, can still be profitably started indoors for later outside planting. After the garden soil has been turned over it is a good plan to put out cut worm bait. When there is no other green food, the cut worms will eat the bait ravenously. Root crops should not be put where similar crops were grown last season. Rotation of crops is better for the soil and helps to keep in check the root maggot. Set hens any time during April. Get eggs of a good strain. Poor stock eggs are not worth the bother.

Tender vegetables should not be planted outside before the 15th of May. The following list is considered tender: beans, corn, cucumbers, egg plants, melons, peppers, pumpkins, squash, sweet potatoes, and tomatoes. If the season is at all backward, plants that have been started indoors do better if not set outside till near June 1st.

A common rule among gardeners is to plant seed four times as deep as the seed is thick. Dahlias and other tubers and bulbs should be planted about the 10th of May. Dahlias should be planted about four inches deep with the tubers lying flat, not standing on end.

Cultivation should begin just as soon or even before the plants appear. Weeds eat up moisture and plant food in the soil much more greedily than vegetables do. All soils have a tendency to form a crust on top. Proper tillage will replace this crust with a soil mulch and help retain moisture. A good motto is, "Use the hoe instead of the hose."

Soak the soil thoroughly when irrigating. If the water tends to run off without sinking in, break up the crust and ridge the surface so that the water has to soak in. In moist soil plants root deeply and therefore stand drought better than when shallow rooted.

In every community and neighborhood there are people who are skillful and experienced gardeners. Teachers should seek to become acquainted with such and get their advice and counsel. Oftentimes there are local conditions understood only by local people.

The U. S. Bureau of Education has issued, through the U. S. S. G., a number of splendid leaflets on garden culture. They are

certainly worth asking for. There are many other sources of valuable information available to the alert teacher, and in this time of the world's great need for food and still more food, every teacher should be alert.

UNITED STATES SCHOOL GARDEN ARMY
Department of the Interior, U. S. S. G.
Bureau of Education, Washington
General Leaflet No. 24

SUGGESTIONS FOR GARDEN SOLDIERS

1. Enlist now.
2. Begin to plan your garden.
3. Pick out your lot.
4. Dump loads of leaves on it and plow or spade them under.
5. Decide upon what seeds you will need and write to your Congressman for them. Do this soon. Tell him you are a soldier in the United States School Garden Army and are getting your plans all made to help Uncle Sam increase the food production of the world. By getting your seeds early you will have time to carefully test them. Northeastern States Leaflet No. 3 or Southern Leaflet No. 9 will tell you how to do this.
6. Organize your company and when you find out who are the best garden workers and leaders, choose them for captains and lieutenants.
7. Name your company.
8. Write to a soldier you know or one you know about.
9. Write a garden song or play.
10. Make a four-minute garden speech to your class or to other class rooms in your building.
11. Chrysanthemums in Washington are selling for one dollar each. Wonder if you could grow one hundred or more next winter that would sell for this much?
12. Watch your potato pile, and if the potatoes show signs of rotting or sprouting, get more air to them.

TO GARDEN TEACHERS, SUPERVISORS OR PRINCIPALS

Please supply data requested on enclosed card. Thanks. We are enclosing herewith a copy of the Fall Manual. Additional copies may be had upon request.

THE FALL MANUAL OF THE UNITED STATES SCHOOL GARDEN
ARMY

Department of the Interior, Bureau of Education, Washington

ADMINISTRATIVE OFFICIALS

FRANKLIN K. LANE,
*Secretary, Department of the Interior*PHILANDER P. CLAXTON,
*Commissioner, Bureau of Education*JOHN H. FRANCIS,
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REGIONAL AREAS

Northeastern States: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey, Delaware, Maryland, District of Columbia.

Southeastern States: Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi.

Southern States: Tennessee, Kentucky, Missouri, Arkansas, Louisiana, Kansas, Oklahoma, Texas, Colorado, New Mexico.

Central States: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Nebraska.

Western States: Montana, Idaho, Wyoming, Utah, Nevada, Arizona, Washington, Oregon, California.

A Garden for Every Child. Every Child in a Garden.

A LETTER FROM PRESIDENT WILSON

THE WHITE HOUSE,
Washington.

25 February, 1918.

MY DEAR MR. SECRETARY: I sincerely hope that you may be successful through the Bureau of Education in arousing the interest of teachers and children in the schools of the United States in the cultivation of home gardens. Every boy and girl who really sees what the home garden may mean will, I am sure, enter into the purpose with high spirits, because I am sure they would all like to feel that they are in fact fighting in France by joining the home garden army. They know that America has undertaken to send meat and flour and wheat and other foods for the support of the soldiers who are doing the fighting, for the men and women who are making the munitions, and for the boys and girls of western Europe, and that we must also feed ourselves while we are carrying on this war. The movement to establish gardens, therefore, and to have the children work in them is just as real and patriotic an effort as the building of ships or the firing of cannon. I hope that this spring every school will have a regiment in the Volunteer War Garden Army.

Cordially and sincerely yours,

WOODROW WILSON.

HON. FRANKLIN K. LANE,
Secretary of the Interior.

A LETTER FROM SECRETARY LANE

DEAR BOYS: I am glad to receive your letter and to know that last year you had a garden plot and that this year you intended to have another. There are boys and girls in Belgium and in France who had garden plots, but those have been blown up by shells, and some of the boys have been killed, too. You can make gardens now, and the boys and girls of France and Belgium will for all time be grateful to you. But your gardens will not be blown up. The more we raise here the more we will have to make strong the arm of our soldiers across the water. That is the reason that we are trying to organize the boys and girls into a school garden army—they really will be soldiers, although not old enough to fight. We who stay at home have a very safe place compared with

the boys in France, and our gratitude for this safety is shown by the work that we do.

The idea just comes into my mind that perhaps you know some soldier who has gone to France, and you might name your garden plot after him. Don't you think that this would be a good idea?

Cordially yours,

FRANKLIN K. LANE.

TO MILTON AND CARROLL TIMBERMAN,
2698 Valentine Avenue, New York, N. Y.

A LETTER FROM COMMISSIONER CLAXTON

*To Boys and Girls in the Schools of the United States,
Greeting:*

We are now engaged in the greatest war in the history of the world. Your freedom and happiness depend on the result. If we win, the world will be free. If we lose, all the world will soon be in bondage to the autocratic German Government, and the freedom for which our fathers fought will be gone. Our young men are going to fight in France and Italy and on the seas. Older boys and girls will work in the fields, factories, mines, shops, stores, and elsewhere, to produce food, clothing, coal, and munitions of war. Most important of all is food. Without it soldiers can not fight, workmen can not produce ships, guns, and shells; and men, women, and children will die. The people of the United States must this year produce more food than they have ever produced before. The President of the United States is therefore asking all boys and girls from 9 to 16 years of age in cities, towns, and villages to join the United States School Garden Army and grow vegetables, berries, fruits, and poultry. There are 7,000,000 such boys and girls. If 5,000,000 of these volunteer, it will be the largest army ever raised in the United States and larger than all other boys and girls' clubs combined. By hard work and with wise direction they can produce food enough to feed all the hungry children of Belgium. Will you join the United States School Garden Army? Your teachers will tell you about the plan.

A happy spring, summer, and fall of joyous, useful outdoor work for you all.

Yours sincerely,

P. P. CLAXTON,
United States Commissioner of Education.

FIRST, CATCH YOUR RABBIT

You remember the story of the boy who was telling about the rabbit he was going to eat, and his father said, "Son, first catch your rabbit." Well, that's the way you must do with these school gardens. Before you can eat the crops you expect to grow, you must get the garden.

For you boys and girls living in the country this will probably be an easy matter. Your fathers will be glad to give you a piece of land for your own use, as large as you are able to handle, where you can grow as many kinds of crops as you wish.

For you boys and girls living in the towns or cities it may be a little harder to get the land for your garden. But many of you will have a back yard of your own where many vegetables can be grown; or your next-door neighbor will be glad to let you use his back yard. At any rate, don't be discouraged if you can't find a place for your garden the first thing. By looking around and sticking to it you will find that there are a great many back yards and vacant lots near your own home which the owners will be proud to let you use after you have told them of the wonderful work the School Garden Army is doing to help win the war.

If your garden is to be in a back yard, pick out one that is not shaded too much by trees or buildings. Growing things need sunlight and plenty of it. And try to pick out land that isn't all clay or gravel. You can't expect to grow much on soil like that. Ask one of your friends who is a farmer or who has a garden of his own to help you pick out the right place for your garden.

HOW TO PLAN YOUR GARDEN

Many of us think of gardening as work to be done only during a few brief weeks in the spring. This is wrong. Your garden will do its best for you if plans for it are made in the autumn and much of its preparation done then.

Here are some things you should think of in planning a garden:

1. *Size.*—The average boy or girl can easily spade and care for a garden 10 by 30 feet. A garden of this size will go far to supply vegetables for a family of four. Your garden should be sufficiently large to grow enough vegetables to make it worth while, but not so large as to make its care too much of a task.

2. *Width between rows.*—Rows must be farther apart if a horse or hand wheel cultivator is used than if you use such as a hoe or rake.

3. *Paths*.—Since your plants must receive personal attention you should plan your garden with paths so that you can reach all parts of it without tramping down the plants.

4. *Rotation*.—This means using the same ground for the growth of one kind of crop, followed by another of a different kind, as a crop of corn followed by a crop of beans. Each plant has habits peculiar to itself. One plant may draw heavily on soil potash, another on soil nitrogen. Besides, certain plants grown time after time in the same soil tends to poison it. Your planting schemes should avoid growing the same kind of plants over and over on the same ground.

5. *Keeping your garden at work*.—A planting calendar will tell you how, by second and third sowings, you can have fresh vegetables at all times during the gardening season.

6. *Use all your land*.—Vegetables which ripen quickly may be grown among those which ripen slowly. Thus lettuce, radishes, spinach, and like vegetables may be planted in the soil between tomato plants, potatoes, corn, etc.

7. *Plants to grow*.—The kinds of plants to be grown will determine very largely the nature of your plan. Radishes and lettuce may be planted closer together than cabbages or corn.

8. *Adding a touch of beauty*.—Finally, if you wish to make your garden not only productive but attractive, flowers may be grown about the borders.

HOW TO PREPARE YOUR GARDEN IN THE NORTH

The soil for your garden should be spaded or plowed if possible in the fall. If this can not be done, then you should do it as early in the spring as possible. If your garden is too small to be plowed with a team, you should spade it deeply with a spading fork. Deep plowing and spading, followed by thorough harrowing and raking, puts the soil in the best condition to make your plants grow. When the soil is spaded, each spadeful as it is turned over should be broken up by striking with the back of the spade. When your garden soil crumbles in your hands, it is just right.

Vegetables are heavy feeders and, therefore, they need a rich soil. Many experienced gardeners use what is known as compost on their gardens. A compost heap is made of a mixture of meadow or garden soil, straw, grass, lawn clippings, unused portions of food or kitchen refuse, sweepings from uncoiled streets, lime or wood ashes, etc. The plan usually followed is to first spread

out a layer of manure about four inches deep, then one of leaves or straw or vegetable waste. Upon these sprinkle a small quantity of lime or wood ashes; then follow with a layer of earth an inch or two thick. Repeat this until all your material has been arranged in layers and placed in piles. Alternate layers of leaves or straw prevent the plant food contained in the stable fertilizer and street sweepings from being washed out and lost.

Turn over your compost heap with a spading fork about twice a season. This mixes the materials more thoroughly and makes them decay more. In a dry climate you should pour water on the heap occasionally.

As soon as part of your compost heap has rotted down enough to mix readily with the soil, it should be spaded in wherever needed. The coarser portions which are slow to decay may well be buried in the bottom of border beds for perennial flowers or vegetables.

The thorough working into the soil of any stable or commercial fertilizer is important. Garden soils composed largely of clay are very likely to be sour, but you can fix this by putting one pound of air-slacked, burned, or hydrated lime; two pounds of ground limestone; or three pounds of unleached wood ashes on every twenty-five square feet of garden space. Coal ashes will help to loosen up a clay soil.

The proper preparation of the soil and thorough working of all fertilizers into the soil are of utmost importance. The success of your garden will depend very largely upon the thoroughness with which your seed bed has been prepared.

KEEPING YOUR GARDEN AT WORK IN THE SOUTH

Every southern home should have a fall garden. That cold weather is coming is not a good reason to stop growing crops and to allow weeds to take your garden. Autumn is really another growing season and your garden would produce at least a fourth more vegetables by keeping the land at work during this season of the year.

Garden soil kept under cultivation in the fall is in better condition for spring use. It should be cleared of all dead vines and other trash as soon as summer crops are gathered. Fall cultivation will help destroy insects as they live in winter in trash heaps or under the surface of the soil. Cultivating the soil breaks up this surface and throws these insects out of their winter homes.

Your late garden work should consist of three things:

1. Taking care of your crops on hand.
2. Planting other crops in their place.
3. Getting ready for your next year's work.

You should try to put a fall crop in the space of every gathered crop. Keep your land working. You should also pick out your fall crops with an eye to your next year's plantings. It is well to have a definite plan for your fall work, just as it is important to plan definitely for your spring and summer work. July is about the first month in the South when you should begin to plan for your fall garden.

Make up your mind, after careful study, what crops will best suit your needs or the needs of your neighborhood and then plant only those crops. Aim to supply your own table just as long as it is possible to raise plants during the colder season. There will probably come a time later when it will be too cold to grow anything in the garden. Until that time comes make your garden work every minute of the day and night.

TAKE GOOD CARE OF YOUR GARDEN

Much of the waste in gardening is due to lack of care after the garden has been successfully started. It is easy enough to plant a garden but it takes patience and continued care to grow a full crop. You ought not to waste anything, now that there is so much demand for food products. Every plant you have in your garden that is neglected and allowed to die is just so much loss to your country.

You should cultivate the soil shortly after each rain in order to break the dried crust and make a layer of dust on top to keep the ground moist underneath. Never work your soil when it is too wet. It should be dry enough to crumble in your hands before a garden plow or hand hoe is used.

Practice regular and thorough stirring of the soil throughout the season. Gardeners sometimes neglect this during dry times. Even if a layer of dust is already present, your garden will be helped by regular cultivation. Cultivation, besides making a layer of dust on top, will:

1. Loosen and break up the ground into smaller pieces.
2. Increase the amount of food that the plants live on, and make it easier for them to get it.
3. Make it easier for the air to get to each piece of soil.
4. Mix the fertilizer better with the soil.
5. Destroy weeds and insects.

While your vegetables are small, cultivate close to the plants and as deeply as the plants are in the soil. As your vegetables grow larger, do not cultivate so deeply but farther from the row. You should cultivate at regular intervals until the plants have grown so large as to make it difficult to use a cultivator. In a small garden a hand hoe or weeder may then be used if more stirring seems necessary.

The wheel hoe is set up on wheels and has several different kinds of shovels. These may be changed for different kinds of work. The wheel hoe is used to cultivate between the rows. It is also used to get the garden ready to plant. It is one of the most useful garden tools. A spade is used to dip up the soil. If you use a garden line in your garden, you can keep your rows straight, thus giving your garden a better appearance.

HUMUS—THE FOOD PRODUCER

Humus is a little word of two syllables—hu-mus—that sounds a bit extraordinary. So did the word automobile 30 years ago. Yet humus is of vastly greater importance to America than are automobiles.

It is up to the teachers of America to make the word humus as common as the word automobile, and its meaning as well known by the man on the street.

Humus is the great basis of food production. The best way to Hooverize is to increase the humus in the soil. An ounce of humus will produce a pound of bread.

Humus is simply the decayed or decaying parts of plants or animals in the soil. Even if derived directly from animals it came first from the growth of plants. The black leaf mold on top of the soil in the woods is almost pure humus in an early stage of decay. The black soil of swamps is also nearly pure humus in a late stage of decay.

The great trouble with most of our poor soils is that for them every day is a humusless day. The first duty of many soldiers in the United States School Garden Army is to furnish humus to such soils. Old leaves, straw, grass, animal or plant refuse of any kind—even garbage when it can't be used to feed pigs or poultry—may be worked directly into the soil or made into a compost heap, which you have already learned about, to decay and be dug in later.

An appalling waste of humus is taking place all the time. We throw it away. We burn it. We let the rivers carry it off. We neglect to produce it as we should.

Let's get down to the real basis in this great business of food production. Let's teach the children of America that to save humus and put it to work is the first duty of the patriot. If food will win the war—humus will produce the food.

MANURES

All garden crops require a rich soil, well supplied with humus. Humus is decayed vegetable or animal matter. Barnyard or stable manure is the best garden fertilizer because it furnishes this humus. In some places it is impossible to get manures for the garden, and you will have to use commercial fertilizers and materials from the compost heaps, which have been described.

When manures are selected for your garden, you should take care that there is nothing in them that will hurt the soil. Sawdust and shavings in manure tend to make the soil sour. If the manure used comes from stables, all shavings and sawdust should be removed if possible. The manure from sheep, pigeons, and chickens contains a great deal of food that the plants use. These manures are more valuable than the ordinary barnyard manures, but must not be spread too thickly over your garden.

It is generally customary to work coarse manure into garden soil in the fall so that it will have time to decay. In the spring, well-rotted manure can be worked into the soil with a digging fork. The amount of manure necessary for your garden will depend upon the condition of the soil. Poor worn-out soils will necessarily need more than rich, mellow soils. From 20 to 30 tons of manure an acre is generally very satisfactory. This means about a pound of manure to every square foot of garden space.

Humus may be added to the garden soil by planting what is known as a leguminous crop. Cowpeas, soy beans, and vetch are excellent crops for this purpose. Such crops take nitrogen out of the air and store it in their roots. After these crops are plowed into the soil, the nitrogen is said to be "fixed" and young growing plants can use it as they need it. This plan of putting humus into the soil is followed only between cropping times and can not be successfully used to any great extent while your garden is in action. When green crops are thus plowed or spaded into the soil, we call it green manuring. •

ROTATING YOUR GARDEN CROPS

When you grow certain crops on the same garden soil in such a way that they follow each other in regular order, it is called "crop rotation." A rotation in which you plant corn in your garden the first year, followed by potatoes the second year, and some crop of the clover family the third year, would be known as a three-year rotation. Many gardeners make the mistake of planting the same garden crop year after year in the same garden space and hence do not rotate their crops.

ADVANTAGES OF ROTATION

Experienced gardeners have found the following some of the advantages secured by rotating garden crops:

1. By planting potatoes in a new place in the garden you will get rid of the potato scab.
2. By planting cabbage in a new place, club-root is gotten rid of and there are not so many insect pests.
3. Different plants will be able to get their food from different soil depths. The potato, onion, and beet get their food from the first six inches of the soil. When these crops are followed by sweet corn, because of the longer roots of the corn plant, its food is gotten from a greater depth.
4. A greater variety of vegetables may be grown and your labor spread out over the year.
5. If you were to grow only one crop, the ground would be bare part of the year, but with a variety of crops you can have something growing for a longer part of the time.
6. Weeds that prove quite troublesome to some garden crops, like onions, may be gotten rid of by planting sweet corn in the same space and cultivating the soil more thoroughly.
7. In general, it is a good practice to find a new place occasionally for your whole garden if you have the room. If you do this, many plant diseases, as well as insects, will disappear.

HOW TO MAKE YOUR HOTBED

If your garden does not have a hotbed for raising early plants you should build one during October when time can be given to it. Making a hotbed is not difficult and gives you a fine opportunity to show how much of a carpenter you are. Every garden supervised by the school authorities should have a hotbed and the building of

this should be one of the earliest garden duties. If your bed is properly made in the fall, it will be in excellent condition for the next spring work.

In making your hotbed, a pit is dug from 2 to 3 feet deep and from 5 to 6 feet wide. Glass sashes are used to cover the pit. These sashes are generally 6 feet long and 3 feet wide, but other sizes may be used if necessary. Make the pit long enough to fit the size of the sash chosen.

Place a 2-inch plank, 12 to 15 inches wide, on edge, on the north side of the bed. Then on the south side of the pit place a plank about half the width of the one used on the north side. The sash, resting on these boards, will then slope toward the south and you will get better results from the sunlight. The ends of the bed are closed with boards cut to fit snugly and soil is banked up all around the framework to keep out the cold. The pit should be dug and the framework arranged in the fall.

The sashes may be hinged at the top and held up by strong sticks when the pit is opened, or they may be hinged on the side and thrown back when the pit is opened. Sometimes the sashes are made to slide in and out on strips of wood set into the sides of the hotbed. The opening of the sashes is necessary to ventilate the bed properly and to allow you to work in the pit.

About 10 or 12 weeks before the time of out-door planting the pit should be filled with well heated stable manure. This manure is covered with 6 or 8 inches of rich soil, finely powdered. Keep the soil moist while it is being heated by the fermenting manure. Keep a soil thermometer in the pit and carefully read the temperature from day to day. When the temperature falls to 90 or 85 degrees, it is safe to sow your seeds. If the bed has been properly made it will give out enough heat to grow plants during a period of five or six weeks.

If you can not buy glass sashes, you can stretch strong white canvas across the pit.

HOW TO MAKE YOUR COLDFRAME

A coldframe is made like a hotbed, except that no manure is used. Enough heat is secured from the sun.

A coldframe is used to harden plants that have been grown in a hotbed, or to continue the growing of certain plants during the winter months. If you should take plants like the tomato directly from the hotbed and plant them in the open field, they

would probably die. They can not stand the quick, great change from warm to cold conditions. If, however, such plants are first hardened by being transplanted to a coldframe, they are able to stand a good deal of cold without injury.

Coldframes should be made in the fall so that they will be ready for spring work. It is sometimes well to have two or three coldframes in your garden, especially in the north, as they will save your plants during the cold spells of spring.

In the middle of the day, when the air is warm, the glass or canvas above the frame may be raised. This gives the plants a better ventilation and at the same time hardens them. As night comes on the plants should be covered. Later on, the frames may be kept open for a large part of the day, but only when the day is warm. Before the plants are taken up and planted in your garden, the sashes should be kept off the frame for several days.

Vegetable seeds may be planted much sooner in coldframes than outside. Thus tomatoes, cabbages, cauliflowers, onions, etc., may be given an early start.

Leaf vegetables, such as lettuce, are better if grown entirely in a coldframe. They may be protected from frost, from too much heat, and from birds.

In many of the Northern States you can not grow plants in a hotbed or coldframe during winter unless more protection is given. This is sometimes done by placing straw or hay over the glass. Hay mats are very useful for this purpose.

HOW TO KEEP JACK FROST AWAY

With some thought and care your garden may be kept producing after the first light frosts of the fall, and the same attention will save plants from the late spring frosts. There are several ways of protecting your plants from frost that will make the garden season longer. During the time when frost may be expected you should read in the papers what the weather man says and see whether he thinks there will be a frost. After a while you may be able yourself to tell when to expect a frost.

Thousands of dollars have been saved by growers, especially in the western parts of the United States, through the use of what are called smudge pots. This is done by putting cans that will hold a gallon or more of oil in different parts of your garden. Place about one can to each 25 square feet of garden space. Fill the cans with a light crude oil, which should cost about 5 cents a gallon.

Keep the cans covered. When the thermometer reaches the danger point and a frost is expected, throw a tablespoonful of gasoline on the oil in the can and light with a torch. The oil will burn in these cans from 3 to 5 hours. Put a thermometer in the coldest place in your garden. Watch the temperature to see whether or not it rises or falls. If the temperature continues to fall, keep the cans going by refilling until the danger point is passed.

Cheesecloth, muslin, sacking, or newspapers thrown over garden plants, such as tomatoes and fall-bearing strawberries, will keep them from being killed by frost. Where your plants are very small use muslin that has been placed over light wood frames. Large frames may also be made to cover several plants at a time. In spring small potato plants just coming through the ground may be protected by covering them with soil, which should be taken off as soon as the danger of frost is over. Tin cans and fruit boxes placed over small plants at night will protect them from frost.

If frosted plants are sprinkled freely with water before the sun rises they may often be saved from absolute loss. It is claimed that if the garden is irrigated while the temperature is at a danger point, garden plants may be protected by the water used.

By using some plan of protecting your plants from frost for a few nights the growing season may be made several weeks longer. In many places there will be one or two frosts that might kill all your plants, followed by a long period of warm weather. If your garden can be protected during these few nights much more produce will be secured from the garden during the season.

HOW TO KILL THE INSECTS

Insects that feed on plants get their food in two ways; some bite out pieces of the leaf, stem, or fruit; others stick a pointed beak into the plant and suck up the sap. Some insects may be killed by putting arsenate of lead or other poison on the plant. Other insects are not hurt in this way but must be killed by some poison which gets directly on their bodies.

Cabbage worms, flea beetles, potato beetles, celery caterpillars, and tomato worms are good examples of insects that bite plants. Aphids or plant lice, leaf hoppers, squash bugs, scale insects, and various plant bugs are good examples of insects that suck up the sap. As a rule, the biting insects are rather easier to kill than the sucking insects, because it is only necessary to dust or spray the plant at almost any time before the insects attack it. In the

case of the sucking insects it is necessary to put the poison on the plants at the time when the insects are present and to repeat it until all are killed.

The best way to kill biting insects is to use arsenate of lead. This may be purchased from all seedsmen and florists, as well as at most hardware and paint stores, in either of two forms: A paste which is especially intended for spraying, or a dry powder which may be used either for spraying or dusting. The way to use arsenate of lead is told in the next chapter. One great advantage of arsenate of lead is that either as a liquid spray or a dry powder it may be put on the plants in almost any strength without danger of hurting them.

Remember that arsenate of lead is a deadly poison. It must never be left where young children may get it.

Write out a list of the insects you have seen that bite plants.

HOW TO USE ARSENATE OF LEAD

As you have learned in the last chapter, arsenate of lead is the best poison to kill insects that bite plants. It may be put on the plants in these ways:

1. Put the dry powder on the leaves and stems with a powder bellows, powder gun, or duster. The best time to do this is early in the morning before the dew has evaporated. Put the powder on thick enough to show a white coating on the plant. This is the easiest and simplest way to kill most insects that bite plants.

2. Spray the plants with lead arsenate powder in water by means of a small pump or hand sprayer in this strength:

Three level teaspoonsful lead arsenate powder to one quart water, or

One ounce or about 10 level teaspoonsful lead arsenate powder to one gallon of water, or

One pound lead arsenate powder to 25 gallons of water.

3. If the paste form of lead arsenate is used instead of the powder, use twice as much lead arsenate in each case.

4. If you find it difficult to make the lead arsenate stick to the leaves, as you may when putting it on cabbage and asparagus, add resin fish oil soap at the rate of 1 ounce or a piece about 2 inches square to each gallon of water. Dissolve the soap in hot water before mixing with the lead arsenate water.

ANOTHER ENEMY, THE APHIDS OR PLANT LICE

The aphids or plant lice are probably the most generally troublesome garden insects. They attack nearly all crops and often cause the withering or death of the plants.

These aphids are sucking insects. Each has a sharp beak that it sticks into leaf, stem, or fruit. Then it sucks out the sap. Although these pests are so small, they increase in number very rapidly. Each gives birth to many young ones and these young aphids grow up in a week. So one aphid upon a plant may soon cause it to be covered with the little green, brown, or black flies. The large number of sucking beaks soon kills the leaf or plant.

Flowers as well as vegetables are commonly attacked by these little creatures. A black kind is often found in large numbers on nasturtiums. A brown kind attacks chrysanthemums. Several sorts of green aphids may be found on other flowers.

Because these pests get their food by sucking the sap instead of biting out pieces of the leaf, they can not be killed by putting poisons like arsenate of lead or Paris green on the surface of the plant. As you learned in another chapter, when you spray or dust such arsenical poisons on potato leaves, the bits of poison are eaten by the potato beetles and the beetles die. But the aphids or any other sucking insects simply push their beaks between the bits of poison to reach the sap within the leaf, and are not hurt by such poisons.

The best thing to use to kill aphids is the nicotine poison in tobacco, described in the last chapter.

In using nicotine washes or sprays against these little pests you must not be content with spraying but once. You should spray your plants two or three times, because if only a few aphids are left they will soon multiply into a great number.

You should use a sprayer that makes a fine mist which will reach all parts of the plants that are being attacked. In the case of vine crops, like melons and cucumbers, you should also spray the under surfaces of all leaves.

Do you remember what you learned about the use of kerosene wash or emulsion to kill these sucking insects?

WHEN TO GATHER YOUR VEGETABLES

If you take good care of your garden all through the season, following the directions given in this manual, you may expect to gather a good crop. This table tells you when to gather several kinds of vegetables that you will grow:

Crop.	Time to Gather.	Remarks.
Beets.....	When young	Beet greens, when tender, make a delicious dish.
Brussels sprouts.....	After frost	Cold improves this vegetable.
Cabbage (early).....	When three-fourths headed	May be left until frost.
Carrots.....	When young	Should always be gathered young when used for soups.
Chard.....	When outside leaves are about 1 foot high	Cut lightly at first. Midribs of leaves can be used like asparagus.
Kohl-rabi.....	Before skin hardens.....	The bulb should be about two-thirds as large as a baseball.
Lettuce.....	While leaves are tender	Small, young lettuce leaves make best salads.
Lima beans.....	While still green.....	Pods should be spongy at the tip.
Melons.....	When they crack around the stem.....	Let your melons ripen on stem if possible.
Potatoes.....	When vines are dry.....	Harvest a few at a time except at end of season.
Radishes.....	When young	Radishes get tough and spongy with age.
String beans.....	When they snap readily.....	Tips should be soft and easily bent or twisted.
Shell beans.....	When pods are well filled.....	Do not let them dry on vines.
Sweet corn.....	When it has just come to milk with blackened silks.....	Should be used as soon as picked.

YOUR ENEMY THE CABBAGE WORM

The cabbage worms are the worst enemies of cabbages and cauliflower. They are greenish caterpillars that may easily be found in the garden at almost any time. They eat the leaves of the growing plants, giving them a ragged appearance. As the cabbages head up they eat the inner leaves and often ruin the heads.

Like other insects, this cabbage worm has a life story which is worth telling:

Some fine morning a common white butterfly may come to your

garden. She stops to lay an egg on the cabbage leaf and then flies away. A week later the egg hatches into a tiny green worm or caterpillar.

The little caterpillar nibbles at the green surface of the leaf, and begins to grow. It nibbles away for a week or so. Then it has eaten so much that it has become too large for the skin with which it was born. So it sheds this skin or molts and crawls out with a new skin which had been formed beneath the old one.

After the first molt the caterpillar feeds again upon the leaf, and keeps this up for several days before it is ready to molt the second time. Then it sheds its skin as before.

The caterpillar keeps on feeding and shedding its skin for about a month. Then it is full grown so far as this part of its life is concerned. It now crawls to the underside of a cabbage leaf or a stone, or board, and fastens itself by a mat of silken threads. Here it sheds its skin for the last time and becomes what is called a quiet chrysalis.

After another week the quiet chrysalis changes to a white butterfly like the one that laid the egg.

HOW TO PROTECT YOUR CABBAGES

The injuries of cabbage worms may be prevented in these ways:

1. Dusting the young cabbages with road dust, ashes, or something similar which prevent the laying of the eggs.
2. Catching and killing the butterflies that lay the eggs.
3. Dusting or spraying the young plants—*before they begin to head, never after*—with arsenate of lead.
4. Dusting or spraying the plants with hellebore, after they begin to head.
5. Pouring on hot water—at a temperature of 130° to 150° Fahrenheit.

HOW TO USE KEROSENE WASH OR EMULSION

You remember that there are two kinds of insects that may attack your garden, those that bite the leaves and stems and those that suck the sap from the plants. You have learned about the biting insects and how to protect your plants from them. Now you are to learn how to prevent damage by the sucking insects.

The best things to use to kill aphids or plant lice and other insects that suck the sap from the green leaves and stems of crop plants are kerosene wash or emulsion and the nicotine extracts of tobacco.

Kerosene, like other oils, kills any insects that it touches. The oil goes through the breathing tubes to all parts of the body, causing death. But kerosene alone also kills the green parts of leaves and stems, so it can not be used alone on crops that are being attacked by insects.

When kerosene and hot soapsuds are mixed together they make a wash or what is called an emulsion which you can put on the green surfaces of plants without hurting them. This mixture is still strong enough to kill the insects.

To make a supply of kerosene emulsion you will need a pail, a small spray pump, and a place to heat water. The emulsion is easily made by following these directions:

Heat one-half gallon of water to boiling. Slice half a bar of soap into pieces and stir it in the water until dissolved. Take it from the fire and pour these hot soapsuds into a pail into which you have put a gallon of kerosene. Then pump the mixture back and forth into the pail until the kerosene is thoroughly mixed with the soapsuds, forming an emulsion.

When the emulsion is made it can at once be diluted with water, mixing easily while still warm. One part of the emulsion should be mixed with ten parts of water.

When the emulsion cools it becomes a jellylike mass, like soft soap. This will keep for months if stored in a cool place. Some of it may be used at any time, diluting with 10 parts of water to 1 part of emulsion. If it is first mixed with a little hot water it dilutes more easily.

A small amount of kerosene emulsion may be made by dissolving one cubic inch of soap in half a pint of hot water and then shaking hard with a pint of kerosene until thoroughly mixed. This is then to be diluted with 10 parts of water.

STORING YOUR VEGETABLES

The storing of vegetables that are not used as soon as gathered is very important, as it is a fine way to lay up food for future use. It is a way to Hooverize many vegetables that you cannot eat at once. Especially at this time, during the war, we must save and use every product possible, and we must not have any waste.

Potatoes, carrots, onions, beets, turnips, and many other of your garden products may be kept for winter use by storing. You will get the best results from storage if care is taken regarding the proper temperature and ventilation needed, the amount of mois-

ture necessary, and the quality of the vegetables when first put in storage.

Some vegetables may be stored on your mother's pantry shelves while others should be put in the cellar, and still others kept in outdoor pits. Sometimes several neighbors join together and build a pit or storage cellar for their vegetables. This is known as community storage. When several gardeners do this the cost to each is small, and the vegetables can be handled more easily.

If you store your vegetables in the cellar, you must take care to see that there is enough ventilation and that the proper temperature may be easily kept. The cellar should have a good earth floor, or, if it has a concrete floor, the floor should be covered with 3 inches of sand. This floor should be kept moist. Beets, celery, cabbage, parsnips, turnips, and potatoes may be stored in the cellar.

The best way to store vegetables outdoors is to use a pit. To build this, dig a hole in the ground 6 inches deep and as wide and long as necessary to hold the vegetables to be stored when piled up. Before putting the vegetables in the pit it should be lined with hay or straw. Cover the piled vegetables with several inches of hay or straw, and then cover the mound with 4 or 5 inches of soil. As cold weather comes on, add 10 or 12 inches of soil to the covering of the pit.

SELLING YOUR VEGETABLES

After your own home table has been supplied with all the vegetables that it needs, you should sell your extra products as fast as they are ready for the market. Your home needs should be supplied first before you attempt to sell to your neighbors. If you raise enough vegetables to supply the needs of your own family you are doing a patriotic war duty, because, in so doing, you are making it possible for other vegetables to go to our soldier boys that would have been needed at home.

You should not only supply your family needs and pay for the cost of your garden, but you should make a neat profit on the vegetables you raise. Don't you think it would also be a fine idea to invest your vegetable profits in War Savings Stamps?

Most selling from our village or city gardens is done by peddling among our neighbors. This encourages thrift and business system on your part. It is a training that you boys and girls ought not to neglect. To sell your vegetables readily there are a few rules that should be followed:

1. Gather all vegetables when they are ripe and ready for the market. Do not pick half-ripe fruits; choose only those that are ready for a quick sale.

2. Grade your vegetables according to size and quality. Do not have a mixture of large and small sizes and good and poor vegetables.

3. Make your display of fruit attractive. Customers will buy quicker and pay more if the goods offered for sale look neat and clean.

4. Do not put the best vegetables on top while poorer ones are hidden beneath. It would be better to separate the kinds and sell them separately.

5. Be honest. Do not claim for your goods what they will not show. Try to keep your customers by honest dealing.

6. Whatever boxes or baskets are used for selling or displaying your vegetables, make them attractive.

Build up a reputation for yourself for honesty and fair dealing.

TYPES OF MARKETING

Community types:

- (a) Children's community market in an attractive central location.
- (b) Children's space in the municipal market.
- (c) Children's market at the school.

Individual types:

- (a) Children's markets at home. This plan provides for sale to those who call at the home, as well as that sold to neighbors.
- (b) By use of parcel post.

Co-operative types:

- (a) Provision for sale of produce through the U. S. S. G. A. officers at central location in city, at school, or in the municipal market.

THE MARKET

Preparation:

- (a) All produce should be in the best possible marketable state.
- (b) Produce should be graded according to size.
- (c) All produce should be clean, fresh, and crisp.

(d) Produce should be graded according to quality.
Display of vegetables:

- (a) Make the market display attractive.
- (b) Use uniform and inexpensive containers.
- (c) See that all produce is free from defects.
- (d) Arrange the display according to types.

Some examples of various types:

- (a) Root type—Carrots and turnips.
- (b) Head type—Cabbage and head lettuce.
- (c) Stem type—Celery and potatoes (underground).
- (d) Leaf type—Leaf lettuce and spinach.

A SONG FOR THE SCHOOL GARDEN ARMY

Composed by Master Joe Lee Davis,
Junior High School, Lexington, Ky.

Johnnie, get your hoe, get your hoe, get your hoe;
Mary, dig your row, dig your row, dig your row;
Down to business, girls and boys,
Learn to know the farmer's joys,
Uncle Sam's in need, pull the weed, plant the seed,
While the sunbeams lurk do not shirk, get to work;
All the lads must spade the ground,
All the girls must hustle round.

CHORUS

Over there, over there;
Send the word, send the word over there,
That the lads are hoeing, the lads are hoeing,
The girls are sowing ev'rywhere,
Each a garden to prepare;
Do your bit, so that we all can share
With the boys, with the boys, the brave boys,
Who will not come back 'til it's over, over there.

A PAGE FOR THE TEACHER

The preceding pages are intended largely for instruction to pupils; those that follow are intended to carry various suggestions to teachers in their relations to pupils.

The United States School Garden Army was organized in March, 1918, and many leaflets were sent out to teachers and supervisors during the succeeding months. The insignia, or service

badges, were furnished to more than a million children and many thousands of service flags, Pied Piper posters, and record books were distributed.

Thanks to the appropriation that President Wilson has allotted for continuing the work, the United States School Garden Army is prepared to furnish during the school year of 1918-19 the following:

- The Fall Manual of the United States School Garden Army;
- The Spring Manual of the United States School Garden Army;
- Insignia or service badges for officers and privates;
- Service flags for Garden Army Soldiers;
- Pied Piper posters;
- Regional leaflets for supervisors and teachers.

These will be sent free to all schools working under United States School Garden Army organization.

Heretofore, gardening, so far as it has been touched by the schools, has been largely a matter of sporadic impulse for a few weeks in spring. The present world crisis shows the necessity of a much more serious and continuous interest throughout the year. The letters on the preliminary pages of this Manual show the opinions of President Wilson and other leaders as to the importance of gardening in the schools. It has become the privilege of every teacher to serve humanity by leading her pupils to sympathetic consideration of garden problems to the end that they may become intelligent producers of food and beauty, not alone during these years of their youth but also throughout their lives.

This Manual will be supplemented by various leaflets for each of the five regions. These leaflets will be sent free to any teacher on application.

The various garden subjects treated should be used for classroom exercises as well as for outdoor projects. The teacher will readily see where these topics may be correlated with other school work. Elaboration of the suggested lessons is not only permissible but is to be encouraged as much as possible.

PLANNING FOR NEXT YEAR'S SEEDS

Last spring many Congressmen received requests for seeds from members of the United States School Garden Army. Most of these requests came so late that the seeds could not be furnished because the supply was exhausted.

To avoid a repetition of this experience the following suggestions are made to teachers and garden supervisors:

1. After school opens let the pupils discuss—perhaps in connection with their language lessons—the crops which have been most satisfactory.

2. Work up a collective statement of the amount of food raised by the Garden Army Company, developing the topic in connection with arithmetic. Be critical of the reports each pupil makes.

3. After a full discussion make a blackboard list of the kinds of crops the pupils wish to raise another year.

4. Have the pupils appoint a committee of three to write to their Congressman. This committee may well consist of the officers of the company. Suggest that they tell him of their garden experiences as members of the United States School Garden Army, and that the pupils would like a supply of certain seeds for next spring—naming the seeds on the blackboard list.

5. Instead of letting the officers write the letter, all the pupils might be allowed to write it as an exercise in letter writing, and the three best letters be sent.

6. In either case inclose with the letter a copy of the collective statement as to the food raised by the company.

7. This opportunity should be utilized as a lesson in civics, letting each pupil learn the number and the geographical limits of the congressional district in which the school is situated and the name of the Congressman now representing the district. Let them see pictures of the National Capitol and of the Congressional Office Buildings.

This suggestion is important and should be followed early in the school year.

SUGGESTIONS AS TO ORGANIZATION

The following suggestions are submitted to teachers and supervisors in the hope that they may be helpful in promoting the organization of the companies of the United States School Garden Army:

Number of members in a company: Ten to one hundred and fifty.

Age limit: Any school child, but preferably the more important companies should be enlisted from the pupils above the third grade.

Requirements for enlistment: The signing of the enlistment sheet in which the pupil agrees to raise one or more food crops and to keep records of his work and the results, reporting them to the teacher or garden supervisor. These enlistment sheets will be furnished by this bureau. The enlistment sheets are to be retained by the garden teacher or supervisor, or filed with the superintendent of schools. The disposition of the record books is left with the garden teacher or garden supervisor. They are not to be sent to this bureau.

A company: The maximum number of soldiers in a company is 150.

Officers: Each company to have a captain and two lieutenants.

Insignia: For the privates, a bronze service bar with U. S. S. G. on it. For second lieutenant the same bar with one star in the border. For first lieutenant the same bar with two stars in the border. For the captain the same bar with three stars in the border. These insignia will be furnished by us upon request stating the number of enlisted garden soldiers.

Enlistment of existing organizations: Any organization of school children now doing garden work will be eligible to enlistment. Such organizations may keep their existing form, if they so desire, and have the additional impetus of belonging to a national army fostered by President Wilson, the Secretary of the Interior, and the Commissioner of Education. The aim of this army is to nationalize and unify the great work in gardening now being carried on and to make it a permanent part of the course of study in all the schools of America.

JUDGING THE HOME GARDENS

The fairest way to judge a garden is to visit it while it is in operation. The judges can then see the conditions involved in making it successful, and can estimate pretty fairly the various points to be considered. Such an estimate is difficult at best, and the following score card is offered simply as a suggestive guide, which any set of judges may modify to suit themselves. Any such modifications should, of course, be agreed upon in advance:

Score card for judging home gardens.

A. General appearance.....	20
Arrangement of rows.....	5
Freedom from weeds.....	5
Cultivation and care.....	5
Proper thinning.....	5

B. Choice of vegetables.....	15
For home use	5
For marketing	5
For canning	5
C. Freedom from pests.....	15
Spraying for insects.....	5
Spraying for disease.....	5
Other remedial measures.....	5
D. Evidences of.....	15
Continuous cultivation.....	5
Companion cropping.....	5
Succession cropping.....	5
E. Care of tools.....	10
F. Value of produce.....	15
Used at home.....	5
Sold in the market.....	5
Used for canning.....	5
G. Accuracy of garden records.....	10
Total	100

STORIES OF BEANS AND OTHER THINGS

The garden operations of the pupils make an excellent basis for language stories. Such stories embody real first-hand knowledge. In telling them the pupils feel the interest of a personal experience.

One advantage in developing such stories is that they can readily be adapted to the different grades. The length of the story depends chiefly upon the number of details mentioned. In the lower grades where the stories are made up of few sentences, only the principal facts are mentioned. In the upper grades details of development and structure are readily included.

The following model stories are suggestive of the work that may be expected of pupils in the third grade:

MY BEAN SEEDS

Yesterday I planted half a pint of bean seeds in my home garden. I put down a line to keep the row straight. I made a furrow along the line with a hoe. I dropped bean seeds in the

bottom of the furrow, one seed every two inches. I covered the seeds two inches deep. I hope they will come up soon.

MY BEAN PLANTS

Early last week I planted some bean seeds in my home garden. This morning I saw them coming up. The stem is curved over at first. It pulls up the two thick seed leaves. Then the stem becomes straight and the large leaves begin to grow. I hope they will grow rapidly.

Such stories may be oral or written or both. They help to make the language lessons real.

USING THE SEED CATALOGUES

The seed catalogues are excellent textbooks on school gardening. They are always up to date. They have attractive pictures. They give prices of seeds in packets or in bulk. They describe the best varieties. Many of them give directions for planting.

These seed catalogues appeal strongly to pupils. Boys and girls know that they are the real thing. They see their value and soon learn how to use them.

Here is a little plan for getting and using these catalogues:

1. Tell the pupils to look in the advertising columns of the magazines for the names and addresses of seed houses that offer their catalogues free to those who apply.

2. Make a blackboard list of all the firms reported. Get a list of at least six or eight such firms.

3. Divide these firms among the pupils so that only a few will send to each firm.

4. Have a lesson on the form of the application, allowing each pupil to make the request in his own way, provided it is in clear and simple English, with proper courtesy. Let the lesson end when the request is written on a post card or as a letter ready for mailing. Find stamps some way and see that the requests are mailed.

5. When the catalogues come, have each pupil keep his own in his desk. Use these in connection with every crop which is planted. Let pupils look up lists of varieties and compare prices and descriptions. Many pupils will be able to bring recent seed catalogues from home. Let these be brought in such cases rather than to send for new ones.

A live teacher can make these seed catalogues one of the liveliest features of a live school.

HOME ECONOMICS

UNITED STATES FOOD ADMINISTRATION

WASHINGTON, D. C.

Subject: DISTRIBUTION OF NEW SCHOOL BOOK.

October 29, 1918.

To all Federal Food Administrators:

The School and College Section of the Food Administration expects to have ready for distribution in the near future enough copies of the new school book, "Food Saving and Sharing," to supply one to every teacher of children below high school rank.

This book contains the most important facts regarding food, is attractive in style and appearance. It is being printed by Doubleday, Page & Company, Garden City, New York, and we propose to have copies shipped from that office direct to county food administrators, if this meets with your approval. Your county food administrators should be instructed to co-operate with the city and county school superintendents in delivering the books to the teachers personally.

We are sure you will appreciate that an approximate estimate of the number of such teachers in each state would not serve our purpose and we ask you, therefore, kindly to obtain for us through your state superintendent of schools, a list showing the exact number of teachers in each of the counties in your state in all grade schools below the rank of high school. If possible, we should like to have the number of teachers in rural schools given separately from the number of teachers in city schools.

At a later date we expect to send to county administrators for distribution in a similar manner, a pamphlet entitled "A Talk to Teachers by Mr. Hoover." This pamphlet will contain advice to teachers with regard to the use of the school book and how to conduct instruction in the subject of food.

Faithfully yours,

UNITED STATES FOOD ADMINISTRATION.

HOUSEHOLD ARTS IN THE ELEMENTARY AND SECONDARY SCHOOLS

The very general introduction of Household Arts into the schools invites critical survey of the present educational status of this branch of the pedagogical tree. Inspection of the household arts phase of the curricula of the elementary and grammar schools, the high school, and the college reveals this situation: In a few schools the work presented would measure up excellently to the requirements of an accrediting committee. But all too frequently the courses are given in a hit-or-miss fashion, without definite aim, and without taking into account the mental development and ability of the student or her preparation through preliminary training. Much of the work now given in the high school is suited to the grammar grades, both in selection of subject matter and in method of presentation. The household arts content of some college courses is presented after a method suitable to the high school, and, again, some of the subject matter and methods used do not merit a place in any school system. Criticism is tempered by the knowledge that the shortcomings in organization of this subject are but typical of any new venture. A partial explanation for such conditions may be offered on the ground that while the idea of presenting home training subjects in the schools was yet very new, superintendents were not sufficiently conversant with the possibilities of such work to supply directive assistance. Again, there has been difficulty in securing teachers adequately prepared to give safe and positive leadership. Of good text books very few were available. Now that these difficulties no longer present themselves as insurmountable barriers, it has seemed timely that we turn our attention to articulation between the grade, the high school and the college.

In the material to follow, there have been kept in mind unity in the plan for teaching, logical sequence in the development of working plans, selection of subject matter for the respective divisions of the school curricula that may best help the girl to understand her social relationships to the family, the school, the community and the world at large, and, the methods of work that appeal to the mental attitude and ability of students in the groups considered.

HOUSEHOLD ARTS AND THE RURAL SCHOOL

This outline has been arranged with a view of placing a working plan in the hands of the teacher who recognizes the need of a school interest in housekeeping, yet has not had special training along home-making lines.

It is not intended that the outline be followed in its entirety by any school. Each locality, with its individual conditions, will call for modifications of any specific set of lessons. The first and main essential is, that the lessons given have a practical value for the members of the school, rather than the narrow aim of recruiting the advance school.

Work of this nature, if practically presented, should be at once a means of creating and upholding interest in the everyday affairs of the household, and should help to develop in a greater degree, observation, inventiveness and exactness.

The household arts lessons outlined are grouped as to kind, but are, in the main, progressive, and so related that each lesson is preparatory to the one that shall follow. The occasional break in logical sequence is intentional, and the arrangement given is adapted to the season or some event. Lessons checked with the asterisk (*) are best reserved as advanced work. The subject matter given cannot be compassed in less than two years unless the time allowed exceeds one and a half hours a week. The outline of work includes a consideration of the selection, preparation and serving of foods practical to the average home; suggestions as to the conditions necessary to safe and healthful homes; the care of house furnishings; the uses and relative values of supplies used in laundering clothes, practice in the care of the injured in such emergencies as burns, cuts, fainting, obstruction of the ear; the use of plain sewing stitches, adapting the stitch to the purpose served; selection and care of clothing; relation of clothing to health. The lessons of thrift learned in war-time should remain a permanent possession.

The results expected must, of necessity, vary greatly in the rural school, but it should be so presented that the younger students may have some part in the development of the greater number of lessons. The part taken by the second grade boy may be limited to the measuring of sugar or milk for the cooking lesson, or to drawing bastings from the piece of sewing work just completed by the older students, or to scouring the knives in the dishwashing. But to insure the greatest success, there should be co-operation on the part of the entire school. It is suggested that, while the girls are

following directions given for sewing, the boys may be interested in constructing the cupboard to be used, in fitting window-boards, minor repairs necessary to the upkeep of desks and other equipment, repairs such as setting loosened screws, or, in working out some of the special problems in agriculture. The sewing may also supply a "pick-up" work for the girls, when the lesson assignments are completed. The cooking lesson may be directly applied and extended in the frequent preparation of food in sufficient quantity to serve as the main part of the school luncheon. Highly valuable are the lessons in co-operation that may result.

EQUIPMENT AND SUPPLIES

Since there cannot in the rural schools be equipment for individual work, students may work in groups, under the direction of the teacher. The students will, without urging, "try out" the lesson at home and report back their success.

The food supplies for the one lesson a week will, in most instances, be gladly donated from the homes represented or business arrangement may be entered upon for the purchase of the same.

Special points to which attention is called are: The value of neatness and exactness in the execution of class exercises; the keeping of strict account of the money value of supplies used whether purchased by the school or acquired through donation, and the keeping accurate and well-organized notebook records.

Of the articles listed below, the pieces that are desirable, but not essential to good work are marked (*). The cupboard may be fashioned by the older students from boxes. The cost of sandpaper, paint and stain need not exceed one dollar.

Finish of box, cupboard, paint, stain, etc.....	\$1.00
Mixing bowl, earthenware, large, 2 quarts.....	.25
Mixing bowl, earthenware, 1 pint size.....	.10
*Bread board .....	.25
Utensil plate, tin.....	.10
Pieplate, agate .....	.10
Dover beater .....	.15
*Wire whip .....	.10
Wooden spoon .....	.10
Case knife .....	.10
Case fork .....	.10
**Palette knife .....	.20
Vegetable knife .....	.20
Bread knife .....	.30

Table spoon, German silver, 1.....	.05
Dessert spoon, German silver, 1.....	.05
Tea spoon, German silver, 2.....	.05
Measuring cup, glass.....	.10
Measuring cup, tin.....	.05
Sauce pan, ½-pint size.....	.10
Sauce pan, 2-quart size.....	.30
Frying pan, iron, small.....	.10
Sifter .....	.05
Muffin pan, set of six, tin.....	.05
Bread tin, small .....	.05
*Lemon squeezer, glass.....	.10
Cork screw .....	.05
Baking dish, 1-pint size.....	.10
Tea strainer .....	.05
*Colander .....	.15
Dish pan .....	.25
Draining pan .....	.10
*Tea kettle .....	.50
Asbestos mat .....	.05
Oven, 12-inch square interior dimension.....	1.00
Vegetable and desk brushes, 2.....	.10
Small china plate, 2.....	.20
Cup and saucer.....	.10
Sherbet glass .....	.10
Small odd dishes:	
Salt shaker .....	.10
Pepper shaker .....	.10
Tray .....	.15
*Cream pitcher .....	.10
*Sugar bowl .....	.15
Jelly glasses, with cover for supplies, 6.....	.15
Fruit jars, with covers for supplies.....	.30
Labels (box) .....	.10
Towels, flour sacks, 3.....	
Dish cloth, crash, 2.....	
Scissors .....	.50
Yardstick .....	.05
Tape .....	.10
Thimble .....	.25
Needles .....	.25
Emery bag .....	.10

Pins .....	.10
Muslin .....	.50
Thread and yarn.....	.25
<hr/>	
Total	\$10.05

The prices given are those of several years ago. If the school undertakes the serving of a hot dish with the school lunch there must be additional equipment. That given herewith is adequate for the group lesson with small quantity of food materials.

***The cost of stove is not given. In some schools the heating stove of the schoolroom will answer the purpose. The purchase of an oil stove must be arranged for.

NOTE: A utensil plate is a cake pan with vertical sides. It is used as a tray for soiled dishes—that they may not be put directly upon the table. The soiled utensil plate is much more easily cared for than the soiled table top. Again the use of the utensil plate encourages neatness in the keeping together of soiled dishes.

REFERENCE BOOKS

Books listed below will be found especially valuable to the teacher who is, for the first time, attempting to teach housekeeping lessons.

There are other excellent texts quite as desirable and in which subject matter is not too far removed from the teacher without special training, and yet it is sufficiently complete to answer many of the questions that will arise.

1. "Elements of the Theory and Practice of Cookery." Revised. Williams & Fisher. Publishers, Macmillan Company.
2. "The Boston Cooking School Cook Book," Fannie Merritt Farmer. Publishers, Whitcomb & Barrows, Boston.
3. "Home and School Sewing," Teachers' Edition, Frances Patton. Publisher, Newson & Co., New York.
4. "Sewing Tablets," by Margaret J. Blair. Webb Publishing Co., St. Paul, Minn. Seven tablets in the series at 50 cents each.
5. "Shelter and Clothing," Kinne and Cooley. Macmillan Company.

*Equipment desirable, but not essential.

**Knife with flexible blade.

***The oil stove, if given the same care as the sitting room lamp, will be as free from smoking.

6. "Primary Nursing Studies," Aikin. W. B. Saunders.

List of publications for free distribution and for sale may be obtained from State Senator or Congressman.

The Secretary of State Board of Health, with offices at Denver, will, upon request, furnish bulletins of interest along sanitary lines.

Bulletins issued by the Boys' and Girls' Clubs give detailed directions for part of the work outlined.

OUTLINE OF LESSON

INTRODUCTORY.

Direction for keeping notebook account of value of supplies used. Let students become acquainted with equipment.

HYGIENE.

Air in its relation to life. Meaning of term ventilation. How ventilation of schoolroom may be most satisfactorily effected. Relation of cellar air to air of house. Significance. Use of thermometer. How to resuscitate one who has fainted or has been overcome with gas.

Heating and Lighting.

- (a) Heating. Relation of air to fire. Understand construction and management of school stove. Compare it, in its parts, with the stove at home. Importance of moisture in the air in winter.
- (b) Lighting. Understand construction and care of lamps. Cause of dim and smoky flames. Give same care to kerosene oil stoves that is required by parlor lamp and as good results will be obtained. How best "put out" fire. Care of scalds. Care of frost bites.

Water Supply and Waste Disposal.

- (a) Water Supply. Water one of the very common carriers of disease. Nature and source of harmful impurities found in water. How made safe for drinking. Why we should drink much water.
- (b) Waste Disposal. The disposal of sewage and garbage. The fly as a carrier of disease.

LESSONS PREPARATORY TO WORK IN COOKING.

Rules for personal cleanliness.

Directions for measuring and table of measures.

Begin a table of comparisons between weights and measures, this to be added to throughout the year; e. g., one pound

flour—about four cupfuls, etc.; juice of lemon—three tablespoonfuls.

Discuss principal methods of cooking.

Table of abbreviations. Hints on how to work. Put in order equipment and supplies. In the care of dishes, towels, cloths, stove and sink and woodwork, and removing of stains, observe carefully the directions given in Williams & Fisher, Chapter 1, Section 4. There can be but the beginning of such work in this lesson. Throughout the course there should be exercised special care as to cleanliness of equipment, and in the manner of working. Obviously, directions for cleaning methods cannot be given in one lesson. These must be scattered throughout the year.

COOKERY

For direction in the preparation of foods the teacher is referred to "The Boston Cooking School Cook Book" and "Elements of the Theory and Practice of Cookery." It is suggested that the latter text be referred to for direction of the "why" of the practices, but that the cook book be looked to for the recipes. Each of the two books is indexed sufficiently to be very usable.

Again it is suggested that for most of dishes prepared half the proportion of ingredients named be used. This will, in most cases, be sufficient for the small school to sample.

PREPARATION OF BREAKFAST DISHES.

Table Setting and Serving.

(See directions and cut given in Girls' Cooking Club Bulletin.)

Fruits.

Food value. Preparation and serving of fresh fruits.
Dried fruits. Illustrate the preparation and serving of oranges, apple sauce, stewed and baked prunes.

**Food Preservation.*

Preservation of vegetables by drying. Compare dried sweet corn, that was cooked before drying, with that which was dried uncooked.

Canning Fruit and Jelly Making.—Bottled fruit juices.

Cereal Foods.

Characteristics of starch food. General directions for cooking cereals. Cream of wheat steamed. Boiled rice.

Eggs.

Test for freshness. Contrast time and methods of cooking with that of cereals.

Hard-cooked egg. Fried egg. Poached egg.

Scrambled Egg and Bacon.

Give special care in the preparation of scrambled eggs, that they may be light and fluffy. The bacon should be evenly browned.

PREPARATION AND SERVING OF BREAKFAST FOR TWO.

Apple Sauce

Cream of Wheat

Scrambled Eggs

Bacon

Toast

Coffee

Have pupils arrange as home-work other combinations of breakfast dishes.

PREPARATION OF SUPPER DISHES.

Potato.

Rules for preparation and cooking: Boiled potato, mashed potato,

Potato on half-shell.

Reasons for steaming sweet potatoes instead of boiling.

Milk.

Composition. Reason for especial care.

Why to be taken as food; not as a beverage.

Pasteurization of milk.

Preparation of junket custard. Cottage cheese.

Cheese.

Composition. Manufacture. General rule for cooking of cheese. Escalloped macaroni and cheese. Rice and cheese.

MILK AND EGG DISHES.—*Custards.*

Boiled custard. Baked custard.

PREPARATION OF WHITE SAUCE.—*Cream Gravy.*

Ways to prevent the lumping of flour in the thickening of milk.

Dishes prepared. Eggs à la goldenrod. Creamed dried beef.

Emphasize the wide range of use for white sauce in cooking, i. e., in the preparation of creamed and escalloped dishes and in the preparation of cream soup.

VEGETABLES.

Importance of leaf vegetables in the diet, such as cabbage and lettuce.

The preparation and cooking.

Directions for cooking strong-juiced vegetables; for cooking sweet-juiced vegetables.

Much attention to vegetable cookery.

Cooking of dried vegetables.

MILK AND VEGETABLES COMBINED.

Creamed potatoes. Cream of potato soup.

Typical of creamed vegetables and cream soups.

PREPARATION AND SERVING OF SUPPER.

Creamed Dried Beef

Baked Potato

Bread and Butter

Marmalade

Tea

Custard

DOUGHS AND BATTERS.—Use of wheat-saving cereals in some of recipes.

Pour Batter.

Use of baking powder, or soda and sour milk, for leavening.

Griddle cakes.

Drop Batter.

Muffins—Use “Twin Mountain” recipe. Steamed puddings.

Soft Dough.

Baking powder biscuit.

Fruit short cake—use of sliced oranges for filling.

Stiff Dough.

Yeast as the leavening agent. Separation of gluten ball from flour. Action of yeast plant. Conditions affecting growth.

Changes in bread in the baking.

Food values. Use for stale bread. In the making of bread the teacher should use dried yeast instead of the compressed yeast. Also it would be well to start some “hop” yeast a week or two before beginning the

bread lesson. Demonstration by teacher to be applied by student at home.

Macaroni and Other Flour Pastes.

Serve as a vegetable with tomato sauce.

MEAT COOKERY.

Meat. Structure. Selection. Cuts. Care.

Composition as affected by heat.

Cooking method employed in extracting juices.

Preparation of broth.

Broth served with croutons, on invalid tray.

Broiled Steak.

Cooking method employed that shall keep in juices.

Serve on hot platter.

Use of parsley as garnish.

Broiled Ham. Bacon.

Broiled ham with tomato sauce.

The use of legumes, nuts and cheese in meat substitute dishes.

ISH COOKERY.

Creamed Codfish.

Codfish balls.

Steamed Salt Mackerel with Egg Sauce or Drawn Butter Sauce.

Attractive and Palatable Dishes Prepared from "Left-Overs."

DINNER MENUS.

Set table for dinner.

Discuss combination of dinner dishes, rules for table setting and serving.

Preparation of dinner. What foods meet the requirements of the very small child, of the girl and boy in school, of the parent.

ICE CREAM.

Mason jar or baking powder can may be used for freezer.

Rules for packing and freezing.

Ice cream.

Lemon ice served in lemon rind to invalid.

CHRISTMAS CANDY AND NUTS.

Sugar. Food Value. Varieties. Effect of Heat and Acids on Sugar.

Peanut brittle. Taffy. Salted nuts.

MISCELLANEOUS.

Preparation of dishes suitable for light refreshments.

Chocolate and Sandwiches.

Tea and Marguerites.

Coffee and Cheese Wafers.

Salads and Salad Dressing.

General rules to be observed in the preparation and serving of salads. Boiled dressing. Cold slaw.

Picnic Luncheon.

Plans for suitable picnic lunches discussed. If possible, plan and give a "Last Day of School" picnic. Apply in the preparation of school lunches.

LESSONS IN SEWING

The sewing should include the application of the sewing stitches to articles to find immediate use in the school room or in the home.

PREPARATORY LESSON.

Correct way of holding the scissors for cutting. Practice in cutting paper. Cut fringed paper to be used later in school decoration for some special event. Tell story of the origin of scissors and of other pieces of equipment. Position while sewing. Drill in the method of threading needle, also in making a knot. Correct use of thimble. Thimble drill. Fold hem in paper.

Even and Uneven Basting Applied to Tea Towels.

Folding and Basting Hems.

Use tape measure in measuring and gauging for hem. Apply in the folding and basting of hem on school curtains. Discuss suitability of various materials for curtains.

Napery Hem.

Apply in the hemming of table linen for some of the homes.

Running Stitch, Combination Stitch, and Overhanding.

Apply in the making of "Holders" to be used in handling hot utensils in cooking lessons.

Back Stitching.

May take the place of the sewing machine stitching where durability is especially desired. Note and correct mistakes that occur. Compare with the half-back stitch, and back stitch, and three running stitches.

Running Stitching.

After trying on small square of muslin, apply in darning worn places on a garment. Apply the weaving stitch in the darning of stocking.

*Bottonholes and Sewing on Buttons, Hooks, Eyes and Eyelet-Snaps.**Mending a Three-Cornered Tear.**Sewing on Lace.*

Apply stitches given in earlier lessons in the sewing of a kitchen apron suitable for wear in cooking lessons. In addition to review there will be advanced work in the gathering and putting on of band.

Sewing lessons may be further applied in the patching of garments brought from home, in the making of school bags, pencil cases, waste paper bags and Christmas gifts. Much of this will be voluntarily worked in as "Busy Work" by the girls. Other hand work that is acceptable is crocheting and braiding of rugs.

Boys should be able to make use of some sewing stitches in the mending of grain sacks and in mending harness, and in making a bag for marbles.

CLOTHING.

Very elementary textile study. Develop such facts as "weight" and "warmth" are not synonymous, and that clothing may serve as "a net to catch air." Compare in warmth the loosely and tightly woven woolen.

Talk over with the girls and boys suitability of clothing to season, occasion and occupation. Bring out the truth that clothing to serve the purpose of adornment need not be much frilled and "fussy" in fashion. Cost studies.

LAUNDRY LESSONS.

The nature of some of the laundry reagents—as starches, bluing, washing powders and soaps. Effect of acids and alkali on wool, silk, cotton and linen.

See Manual on Laundry Practice.

Such manuals may be secured at nominal cost.

*Practice in Removing Stains.**Laundry Processes.*

The "why" of thorough rinsing of clothes before and after bluing; of long cooking of starch, of glue in starch;

of care in shaking out of clothes before hanging on the line, and of folding in taking down clothes.

The special care to be given in the washing of woollens with the reasons for such precautions.

Home-made Soap

HOME NURSING.

The Sick Room.

The screening of light, and airing of sick room.

How to make a bed correctly. How to change bed linen with patient lying in bed. The "nevers" that should unquestionably be observed in caring for the sick.

Care of Convalescing Patient.

Care of the hair, the teeth, and the mouth.

Bathing.

First Aid to Injured.

Bandages and bandaging. Care of bruises.

How to remove foreign bodies from the eye, ear, nose and throat.

SHELTER.

Apply facts developed in discussion to the schoolroom insofar as feasible.

HOUSE MANAGEMENT.

Demonstrate in the care of school equipment, the schoolroom and door yard.

Account keeping. Inventory. Extermination of household pests.

CORRELATION

There is afforded great wealth of opportunity for the correlation of Household Arts with other subject matter offered in the curriculum. In connection with geography may be given emphasis to source and manufacture of the products used locally. The spelling lesson may well include such words as measuring, sandwich, macaroni, scalloped, escalloped, leavening. Computation of the cost of the materials used in the cooking lesson and the division of the recipes are appropriate exercises in arithmetic. The language lesson may reproduce in original form the fascinating story of the difficulties under which the potato was introduced into France, or, again, there may be the writing of the letter to the Department of Agriculture for the bulletin on Food for the Child, or that dealing with Farm Mechanics.

THE HOUSEHOLD ARTS IN THE GRADES

Seventy-five out of every hundred children in the United States fail to reach the high school. Within a few years after graduation from the grades the majority of the girls marry. Facing this fact, it is pertinent that we ask ourselves what the school can do that will last over the intervening wage-earning days and what it can offer as an incentive toward better preparation for home making.

We are coming to think of the school as an extension of the home and to believe that if we are to secure the fullest benefits from what we are pleased to call Education, we must bring life into education so that it will be problem solving as well as informational and liberalizing. Concrete suggestions are given, therefore, to show how organization for the teaching of housekeeping practices throughout the grades may, to a degree, accomplish that aim.

The general aim in giving the home training work is, obviously, to develop insight into what constitutes good home conditions. And in the upper grades the girl will be found to be most responsive to stimuli, intensely ambitious, open minded, and highly imaginative.

The concrete end in view is the development of manual dexterity to the point of habit. While in the first four grades we look for neatness in the finished product we do not require accuracy in a high degree. Nor are we so concerned that the girls know the "why." In the four upper grades there is the beginning of emphasis on the reason for certain procedure. A valuable result that follows the acquisition of dexterity is the greater self reliance that comes from the consciousness of ability to do things well. It must be remembered, too, that manual operations thoughtfully carried on have value in mental training.

Little work of experimental nature should be given in the grades. There is danger of dulling the edge of interest by the premature introduction of principles and processes.

Save in the four upper grades the subject matter outlined need not occupy a special period of the schedule. It may better be an intimate part of the subject matter presented under the titles: Geography, History, English, Stories, etc. That the housekeeping interests are discussed is but to give emphasis to the possibilities in this direction. In the fifth and sixth grades one forty-

five minute period a week to be given regularly to work outlined will be adequate.

OUTLINE FOR STUDY

First Grade

The play house affords abundant freedom of expression by the child. And the interest surrounding the play house and the dolls and toys helps to bridge the gap between the home and the school.

Second Grade

Help the child to interpret her surroundings. Discover explanations for the differences in immediate surroundings of the farm and town homes, food habits and household practices.

Third Grade

Contrast the present home life with that of the people who live more primitively, as the Eskimo and the Indian. Repeat some of the experiences of primitive peoples. Methods of cooking. Materials used for clothing and how determined. Idea of ornament. Reproduce houses of people studied.

Fourth Grade

THEME.—Colonial Life.

If possible, prepare in group some of the food dishes of the colonial period. Contrast methods of heating and lighting with those of today. Dip candles, make soap. Care of brass and copper. Reproduce other housekeeping practices.

Fifth Grade

HOUSEKEEPING.—Table setting and reasons for what is designated as table manners. Dish washing. Ventilation. Cleaning practices. Care, order and arrangement of cupboards. Bed making. Care of house plants. Personal hygiene, particularly stressed. First Aid. Extermination of household pests.

Sixth Grade

The beginning of hand sewing. Stitches to be applied on articles for use—dust cloths, hemming towels, Christmas gifts.

Here introduce one of two interesting problems, such as the making of a cooking apron for the next year. Elementary study of textiles.

Seventh Grade

COOKING.—All cooking exercises to center about the cooking

and serving of breakfasts, dinners, and suppers. At the conclusion of the year of cooking lessons the student should be able to prepare many basic dishes independently of books and notes. And in the preparation of more complex dishes, to follow recipes intelligently. Invariable phases of the lessons in cooking should be selection, purchase and care of food, proper combinations and proper selection as to kind and amounts for the individual members of a fairly typical family. Housekeeping practices, too, are taught insofar as they are an inseparable part of good laboratory practice and applicable in the upkeep of the school room and school laboratory. In the purchase and care of supplies and housekeeping equipment used in the laboratory, it is highly desirable that the student be conferred with. Such actual lessons in purchasing, account keeping, upkeep, storage and the inventory are of infinitely more value than text-book study of the topics named. The war-time lessons of thrift and conservation should be guarded zealously.

Eighth Grade

The use of the commercial pattern in cutting. Sewing stitches and machine sewing necessary to the care and repair of clothing and the fashioning of a simple garment. Consideration of color and design in the selection of clothes. Cleansing textile fabrics. Laundering. How to combat clothing pests. Household linens, purchase and sewing. Inventory of household textiles.

LABORATORY PERIODS

Any plan calling for a large amount of time, of necessity, involves adjustment of class schedules and co-operative effort on the part of teachers of other subjects. Ordinarily where the work is given at all, a double period (ninety minutes) a week is allowed. In that time it is impossible to complete in one period many of the laboratory processes regarded as indispensable, and unless the double period on two successive days can be arranged for, some of the valuable lessons must be omitted. The interval of a week between lessons is a destructive length of time. If for the seventh and eighth grades, an entire afternoon session once a week is allowed, a high grade of accomplishment is possible. And if the work in the housekeeping arts is rated at its true value, instead of the fictitious value we are accustomed to assign to it, that time is not an unreasonable allowance in proportion to the amount now given through the years to each of the other subjects in the curriculum—subjects no more essential in the training for citizenship.

It is not possible to say that in all schools alike there should be adopted in its entirety a fixed course of study. Conditions determine the kind and amount of work given. But it has seemed desirable to give a definite plan to "vary from."

Whatever the work in kind and amount, the results should clearly show the working out of definite and worthy aims in the mind of the teacher. The student should be conscious of having accomplished a definite aim that was clearly in her mind at the outset.

BIBLIOGRAPHY

Where work has been given to the limited extent indicated in the foregoing plan, a text book can scarcely be used. From among the texts and reference books given in the outline for High Schools there may be selected a very usable library.

THE HOUSEHOLD ARTS IN THE HIGH SCHOOL

At the outset it should be definitely understood that the outline of work presented herewith is not with the purpose of preparation of the girl for college courses in Home Economics. Rather is it the aim to help the girl to qualify for the vocation in which the overwhelming majority of girls will be ultimately engaged. The household arts subjects we have come to recognize as rational elements in the education of girls. And if these elements do in turn receive rational treatment making them intellectually, socially and economically worth while, the Household Arts course will articulate with the college and with life equally well. It is with this end in view—that of stating definitely the nature of subject matter and methods suitably employed—that the material to follow has been prepared.

Quotation from the report by the Committee Upon Articulation of the High School and College adopted by the Secondary Department of the National Education Association, July 11, 1911, will explain how there came to be selected the special academic units, together with the units in Household Arts given as the "suggested requirements" in the tentative plans now submitted. The quotation just referred to, is as follows:

"Your committee recommends the adoption of the following definition of a well-planned high school course:

"1. The quantitative requirement should be fifteen units.

"2. Every high school course should include at least three units of English, one unit of social science (including history), and one unit of natural science.

"3. Every high school course should include the completion of two majors of three units each, and one minor of two units, and one of the majors should be English.

"4. The requirement in mathematics and in foreign language should not exceed two units of mathematics and two units of one language other than English.

"5. Of the total fifteen units, not less than eleven should consist of English, foreign language, mathematics, social science (including history), natural science, or other work conducted by recitations and home study. *The other four units should be left as a margin to be used for additional academic work or for mechanic arts, household science, commercial work, and any other kind of work that the best interests of the student appear to require.*

"We recommend that section 4 of the definition of a well-planned high school course be supplemented by the following additional statement: 4. (a) In the place of either two units of mathematics or two units of a foreign language, the substitution, under proper supervision, should be allowed of two units, consisting of a second unit of social science (including history), and a second unit of natural science. In other words, there should be allowed, under proper supervision, the selection of four units from the following:

"1. Two units of one foreign language.

"2. Two units of mathematics.

"3. Two units consisting of a second unit of social science and a second unit of natural science."

In the planning of the Household Arts course, then, the contributing subjects that go to make up the "margin of four units," deal with food, clothing and shelter, and house management. In the distribution of this home training subject matter, as in the distribution of subject designated as the liberal arts, it is not to be expected that we shall all of us agree. For example, in the liberal arts subjects, some of us would advocate that more time be devoted to the study of history, believing that through the looking backward to "see the direction of one's way," the girl will more fully appreciate and enjoy the advantages of her place in history. Others maintain that high ideals of culture and social service may best be gained through more intensive study of social science. Difference of opinion also prevails as to whether a keener language sense may be developed through the study of Latin and English, or through the more intensive study of English alone. And so in the plan for Household Arts training, while we

all of us have the same end in view, that of the socialization of the girl, we shall, many of us, both because of difference in local community needs, its facilities for instruction, and difference in opinion as to the pedagogical method to be employed, find it necessary to vary from the plans submitted. After all, it is not so essential that we all adopt the same definition, as that we do in the selection of subject matter, and in the method of presentation, have specific, as well as general aims in view—aims that are worthy.

General aims in the training of the girl we have well in mind. Mention will be made of three specific aims that should stand out boldly in the high school teaching.

The first is that of securing knowledge fundamental to efficient house management and skill in performing household tasks. Success in the accomplishment of this aim will be measured by independence and foresight in work, and economy in the use of materials, time and effort. Inseparable features will be cleanliness and orderliness. If the accomplishment has become a vital part of the girl's life it will be reflected in a visible way in her out-of-class-room habits as well.

The public has clamored for work that is "practical," and some have attempted to make that demand the one specific aim. Conceptions vary, as to what is "practical domestic science." In one locality, the tendency has been to regard the work of the classes in foods and cookery and in textiles, as purely mechanical. The end of all ambition is to make bread or to sew a dress, as the case may be. In another, the aim has been to require that the Household Arts classes serve local convenience rather than educational needs, and the class in foods and cookery becomes a catering agent, giving itself a repetition in work for the convenience of a lunch room. The class in textiles serves to replenish the wardrobe of the students enrolled. To be sure, it is a laudable ambition to turn one's learning to good account, but the immediate product should be an incidental part of the class work rather than the end. Still another school devotes itself to the abstract setting forth of theories. Again, in the town of excessive social inclination, the whims and fancies of the community may direct the household arts activity. While it is desirable, indeed, most desirable, that the work in household arts should meet the community need, yet, in our eagerness to set up as one of the specific aims "making the work practical," it must be kept in mind that the vital consideration is the girl, and the effect of the work upon her, that is of great community concern.

A second specific aim is that of helping the girl to establish standards. The common basis on which rests a desirable standard takes into account appreciation of simplicity, quality and justice. In an age which some one has designated as the day of "millions for display, but not one cent for comfort," it is timely that simplicity and quality receive special emphasis. At a time, too, when we are given to running confusedly about on the surface of things, there is need to give greater care to insistence upon thoroughness and genuineness. Justice takes into account consideration for others, co-operation through team work and measuring up to responsibility. This awakening of the sense of social consciousness should find frequent application in the Household Arts curriculum.

A most important consideration is that of adopting methods suited to the ability of the student. Where household arts work is offered in the elementary grades, there, obviously, it is not to be expected that the constructive work be finished and accurate. As the student advances in years and ability, accuracy receives stronger emphasis and work is performed that is technically worth while. In the work of the high school, there is added to this stress of the "how," opportunity for the development of reasoning powers and judgment through the working out of the "why" of the principles and processes involved in laboratory practices. Work that is truly educational will give skill in the treatment of materials and equipment, and useful adaptation of the same. Work that is truly educational will lead the girl to follow up the details of a process in logical order, helping her to see a reason for every step and to eliminate the useless steps. A precaution to be taken by the teacher is to not go beyond the depth of the student or to touch superficially too many lines. Far better is it to train in independent thinking along fewer lines. Contrary to current opinion there are not required as a result of her training, more costly materials and equipment for the home application of the knowledge and skill gained. Rather does it mean that she has acquired increased ability in adapting to its best possible use, the everyday means at hand. Her ability should make possible a hundred per cent. increase in the attractiveness and palatability of the square meal without increasing the cost. It should mean the cutting down of time and energy ordinarily expended in housekeeping routine through the introduction of improved methods of manipulation and improved arrangement of working equipment.

Related and non-vocational subjects given as "required" will supply the background necessary to relate the girls' interests to those of the larger world, to give artistic appreciation and to aid in interpreting technical subject matter. It should mean that her skill in selection, in design and in execution should cut down the cost of clothing. These are a few of the possible accomplishments for the girl of today.

THE HOUSEHOLD ARTS COURSE IN THE HIGH SCHOOL

Tentative Plan No. I

Suggested requirements:	Units
English and Literature	3
Foreign Language	2
Social Science, including History	2
	1
	or
Mathematics	1
Science	3
Household Arts	4
Schedule suggesting distribution of household arts subjects and their science pre-requisites (Pre-requisites checked):	

Ninth Grade

First Semester—	Units
Biology	1½*
Textiles and Garment Making	1½
Second Semester—	
Freehand Drawing and Design	1½
Foods and Cookery	1½

Tenth Grade

First Semester—	Units
Foods and Cookery	1½
Second Semester—	
Physiology (Personal Hygiene, First Aid, Home Nursing, and Child Care)	1½*
Textiles and Dressmaking	1½

Eleventh Grade

First Semester—	Units
Physics	1½*
Design Applied to Costume and the House.....	1½
Second Semester—	
Physics	1½
The House.....	1½

<i>Twelfth Grade</i>		Units
Chemistry throughout the year.....		1
First Semester—		
Advanced Dressmaking		1/2
Second Semester—		
Elementary Dietetics and Planning and Serving of Meals		1/2
In consideration of subjects bearing on foods, shelter and clothing, there should be kept in mind the economics, hygienic and æsthetic aspects.		

Tentative Plan No. II.

Suggested requirements and distribution of science pre-requisites are the same as those indicated in Tentative Plan I.

Schedule suggesting the distribution of household arts subjects :

<i>Ninth Grade</i>		Units
First Semester—		
Textiles and Garment-making.....		1/2
Second Semester—		
Freehand Drawing and Design.....		1/2

<i>Tenth Grade</i>		Units
First Semester—		
Foods and Cookery.....		1/2
Second Semester—		
Design		1/2

<i>Eleventh Grade</i>		Units
First Semester—		
Textiles and Dressmaking.....		1/2
Second Semester—		
Costume Design and Dressmaking.....		1/2

<i>Twelfth Grade</i>		Units
First Semester—		
The Planning and Serving of Meals.....		1/2
Second Semester—		
The House.....		1/2

The amount of time allowed for Design is in recognition of the urgent need of offering to the girl in the high school this appeal to the æsthetic side of her nature at a time when she is most susceptible to such an appeal. The provision for giving the work in daily recitations, as is customary in the teaching of algebra and Latin,

and, the giving of all laboratory courses in double periods (90 minutes) and daily, as indicated in the plans set forth above, offers the only possible means for securing worth-while results.

THE CONTENT OF HOUSEHOLD ARTS SUBJECTS

A graphic statement of the scope of the Household Arts course is expressed in the syllabus of Home Economics published by the American Home Economics Association at Baltimore, Maryland. That syllabus suggests how rich and varied may be the content of such courses.

A brief synopsis of the contents of each of the Household Arts courses named in the tentative plans follows:

Textiles and Garment-making includes the making of simple muslin and cotton garments, demonstrating the elements of hand- and machine-sewing. Orderliness, neatness, cleanliness and accuracy in execution, characterize the work. Elementary study of textiles and suitability of stitches to material is an accompanying feature.

Textiles and Dressmaking. Elementary drafting, or, the relating of measures to the commercial pattern and use in the making of a cotton dress.

Advanced Dressmaking. Drafting, design and art needlework applied in the making of a simple wool dress. Re-making, care and repair of clothing. The further consideration of line and color in the selection of the ready-made garment.

Foods and Cookery. The selection of food; source; manufacture; economic value; knowledge of the effect of heat, cold or fermentation upon the composition of foods insofar as it will greatly influence the preparation of food for the table; methods of food preparation that are fundamental in cookery with emphasis on technique; and the working out of the "why" of the principles, and consideration of uses and relative values of various types of cooking apparatus.

Elementary Dietetics and the Planning and Serving of Meals. Quality and quantity of food adequate for nutrition and health. Desirable combinations of foods for meal service. Especial attention given to food for the child. Excellence in cooking, attractiveness, yet simplicity in service, and cost of food prepared are invariable features of the work.

The House. The site, surroundings, household ventilation, heating and lighting of the house; the water supply; the disposal

of wastes; the relation of the household to health organizations; construction of the house; house plans suited to typical community conditions; practice in drawing skeleton plans; consideration of furnishing from a sanitary and artistic standpoint; standards of living.

Freehand Drawing and Design. Study of freehand drawing as a basis for work in designing. Drawing of plant forms using the same design motifs. Principles of perspective and object drawing. Principles of design and simple problems as applied to clothing and the house.

Design. Comparison of good and bad designs for house furnishings, and textiles for home use. Practical application of design in costume and in the house.

TEXT BOOKS FOR THE SECONDARY SCHOOL

FOOD.

Authors, Williams and Fisher; title, Theory and Practice of Cookery; publisher, Macmillan; \$1.00.

Author, Kinne and Cooley; title, Food and Household Management; publisher, Macmillan; \$1.10.

Author, M. S. Rose; title, Feeding the Family; publisher, Macmillan; \$2.10.

Author, Farmer; title, Boston Cooking School Cook Book; publishers, Little, Brown & Co., Boston; \$2.00.

CLOTHING.

Authors, Kinne and Cooley; title, Shelter and Clothing; publisher, Macmillan; \$1.25.

Author, Hasluck; title, Sewing Machines: Their Construction, Adjustment and Repair; publishers, Cassell & Co., Ltd., New York; 60c.

Author, Laura I. Baldt; title, Clothing for Women; publishers, Lippincott & Co.

SHELTER.

See List of Reference Books.

HOUSE MANAGEMENT.

Author, Child; title, The Efficient Kitchen; publisher, Robert M. McBride Co., N. Y.; \$1.25.

Authors, Maxwell and Pope; title, Practical Nursing; publisher, Putnam, N. Y.; \$2.00.

Author, Balderston; title, Laundering; 1224 Cherry Street, Philadelphia; \$1.25.

or

Author, Aikens; title, Primary Nursing Studies; publisher, W. B. Saunders.

PERIODICALS.

The Journal of Home Economics; American Home Economics Assn., 1211 Cathedral Street, Baltimore; \$2.00.

The Home Beautiful; 41 Mount Vernon Street, Boston; \$3.00.

REFERENCE BOOKS FOR THE SECONDARY SCHOOL

FOOD.

Author, Sherman; title, Food Products; publisher, Macmillan; \$2.25.

Author, Snell; title, Elementary Household Chemistry; publisher, Macmillan; \$1.25.

Author, U. S. Food Administration; title, Food and Shelter; publishers, Houghton, Mifflin Co., Chicago; 75c.

Authors, Matteson and Newlands; title, A Laboratory Manual of Foods and Cookery; publisher, Macmillan; \$1.25.

Author, Powell; title, Successful Canning and Preserving; publisher, Macmillan; \$2.00.

Author, Sherman; title, The Chemistry of Food and Nutrition; publisher, Macmillan; \$1.50.

CLOTHING.

Author, Baldt; title, Clothing for Women; publishers, J. B. Lippincott Co., Philadelphia; \$1.25.

Author, Weed; title, Household Chemistry (Textiles); publishers, American Book Co., Chicago; \$1.25.

Author, Patton; title, Home and School Sewing; publishers, Newson & Co., N. Y.; 50c.

SHELTER.

Author, Robinson; title, Domestic Architecture; publisher, Macmillan.

Author, Quinn; title, Planning and Furnishing the Home; publishers, Harper Bros., Franklin Square, N. Y.

HOUSE MANAGEMENT.

Author, Taber; title, The Business of the Household; publisher, J. B. Lippincott Co., Philadelphia; \$2.00.

THE SCHOOL LUNCH ROOM

There is a tendency on the part of school authorities to delegate to the classes in Domestic Science all responsibility for the school lunchroom, not realizing that this is misuse of the periods ostensibly

set aside for constructive work in the household arts. This is an unfortunate practice from two points of view. Much of the cooking for the lunchroom is of necessity routine work, and it is a psychological truism that "To keep on growing one must meet new problems, learning new things, thus developing the powers of reasoning and judgment. Any manual labor ceases to be educative the moment it becomes thoroughly familiar and automatic." Aside from this pedagogical mistake, there is injustice in the proceeding. It is manifestly unfair to require of the teacher of Domestic Science the conduct of the lunchroom unless she is proportionately relieved of other duties, which is most rarely the case, and, unless she is definitely engaged to undertake that work.

Provision for the school lunch is a highly desirable child-welfare movement—one in which all parents and all teachers alike should share interest and responsibility. But business-like arrangement should be made for the satisfactory carrying on of the enterprise. Quite as logical is it to expect that the class in physics demonstrate the working out of the theory of surface tension by removing grease spots from the clothing of the student group, as that the Domestic Science class carry on the lunchroom, or again, that plumbing repairs and the daily care of the heating plant through the school term be made a part of the study of the principles of hydraulics and mechanics. Quite as reasonably might the classes in arithmetic express their practicality by taking over the business accounting of the school. The class in hygiene, too, could perform janitor service and remove the "matter out of place." And such a wealth of practical school problems could be supplied to the chemistry, botany and biology classes.

There is a possible and a desirable connection between the Domestic Science class work and the school cafeteria, a connection satisfactorily demonstrated in a few schools. It is as follows: The classes in food and cookery follow a schedule of lessons logically worked out. The lessons are planned independently of the lunchroom needs. The lunchroom is cared for in a business-like way, under the direction of one specifically employed for that purpose. On days when the product of the cookery class will find a place in the lunchroom menu, provision is made in advance for this large quantity cookery and the class given credit for the cost of food provided. Under such conditions, both enterprises proceed in a manner worthy of respect.

MANUAL TRAINING AND VOCATIONAL EDUCATION

INTRODUCTION

It is exceedingly gratifying to school administrators that the schools of the nation must be called upon and can be of indispensable service in this great world crisis.

What will be the ultimate result of this recognition of school efficiency?

Already school-training has been found efficient beyond general prediction. Yet, the prediction is made that school-training will be found weak, trivial and formal in the direction of the industrial arts. From everywhere comes the call for more expert mechanics and tradesmen to carry on the work in hand. But the number is inadequate. When the schools are appealed to for trained mechanics and tradesmen or for the immediate organization of instruction in these practical arts, their response has always been generous, but acknowledgement is often made that they are equipped for the training of professional engineers, professional agriculturists, professional in everything but not for the training of expert workmen.

If our education is to be democratic in its conception, it must necessarily meet the needs of the vast majority of the nation's citizens whose activities are identified with the trades.

Already it has been hinted at this writing that whatever form of military training shall be adopted in this country at the conclusion of the war, it is quite likely to be accompanied by vocational education to the extent of having vocational education the predominating feature of the plan. This is in line with President Wilson's ideas on the subject and will be an administration measure.

Henceforth, there will be enormous and varied demands laid upon the industrial arts departments by the needs of war industries, war relief agencies, and by post-war considerations.

Thus education is helping to win the war.

Never before in the history of our country has education received so much attention in government councils as it does today. Many government agencies are now involved in shaping the education of our nation into various channels, and people everywhere are responding heartily to the cause of universal training that shall make for social service.

If our nation is to win in the great industrial and economic war which is to follow immediately the war with arms, preparation must be made on the basis of efficiency and this should reach all lines of endeavor and should find its final attainment through education. The final victory along industrial pursuits will go to the people whose hands are trained to perform operations in the industrial field, and this imposes on the schools the necessity of providing industrial and vocational training.

Present standards and values in education must be changed. The schools of the country are now challenged with greater responsibilities and put to the test as they never have been before.

A. *Types of Instruction.*

According to their aim, scope and function, we have today a number of educational enterprises that make for skill and industrial intelligence from a plane quite limited to a degree which reaches the very acme of perfection. Among them are sloyd, manual training, provocational, vocational, industrial, technical, trade school, continuation school, part-time co-operative plan, etc.

The kind of instruction given depends largely upon its need and for whom it is intended, the facilities for carrying on the selected type of education, qualifications of teachers and methods of administration and supervision, the size of the communities or cities where such training is to be given and the amount of the time allotted.

B. *Manual Training.*

1. Definition of Manual Training: Manual training is any form of instruction that introduces the boy to a series of typical, practical problems along industrial lines.

2. Aim and Scope of Manual Training Work:

Aims to provide for the needs of children from 12 to 16 years.

To overcome the isolation which so often exists between school and life.

To teach creative interests and develop creative powers.

To bring the boys into a more complete contact with life.

To insure the natural and healthy growth and development of our youth.

To train for the appreciation of all life's activities and the development of good citizenship.

To bridge the gulf between thinking and doing.

To uncover tastes and ability for vocational work.

To lay the right foundation for all forms for all productive and creative work.

To embody in its teaching a more strictly vocational trend for a broader view of life.

To touch the life of the boy in his work, play, school and home.

To give boys to whom book methods of instruction do not appeal, an opportunity to find themselves.

To correlate with other school subjects or academic work and must necessarily be cultural as well as vocational.

a. *Elementary Period of Manual Training.*

The elementary period, is that period which follows immediately the kindergarten or primary period, extending normally to about twelve, and embracing the instruction given in the first six years of the public school course. The limits, however, of this period cannot be definitely fixed.

The primary aim of manual arts in the lower grades (primary and elementary) should continue to be general education.

In grades one to six not less than one-tenth to one-eighth of the present school time should be set aside for elementary handwork.

Shop work under the direction of a manual training instructor may begin with the fifth grade.

The nature of the work undertaken must of necessity be in keeping with the nature and needs of the pupils in hand.

Work can be done in thin or soft wood, paper and cardboard, clay, raffia, reed, yarn, etc.

“The best effect of manual work is seen in the moral power it exerts. Bodily occupation is everywhere elevating and healthful, and morality and religion are built upon industry.”—Clarence Franklin Carroll.

1. Aims and Standards of Instruction in the Elementary Period.

The aim of instruction and choice of subject matter and projects in making a curriculum in Manual Training for the elementary period should be governed by the following:

To be essentially informational and developmental in character.

To appeal directly to the instincts and interests of the pupils.

To assist in the development of right habits of thinking.

To enable the child to live more efficiently his life of choices.

To develop the child's senses and powers of observation.

To establish the more fundamental forms of mental and muscular co-ordination so essential for efficiency in all forms of future work.

To give the boy a sympathetic attitude toward his fellow man as worker.

To develop a large variety of mental and physical forms of control which later form a necessary basis for successes in any field of work.

To develop the artistic or æsthetic sense of the pupil for the beautiful.

To correlate freely and vitalize the work of the regular school course.

b. *The Prevocational Period.*

The prevocational period, extending from about twelve to sixteen, and embracing normally the work of the last two years of the elementary and the first two years of the high school.

In many school systems this period takes in the division known as the "junior high school," grades seven, eight, and nine.

1. *Aims.*

As a part of the junior high school, the tendency in prevocational education is in the direction of offering an acquaintance with a variety of industrial occupations as a part of the school program, enabling a boy to find himself and helping him somewhat in choosing his future occupation.

It is the "finding and try-out" period in a boy's education which is usually coupled with a study of those subjects which will give him a broad and necessary foundation for professional and technical work. In most cases the vocational work in the higher technical trade, vocational and professional school will not begin until the prevocational or professional preparatory courses have been finished.

"Prevocational work has for one of its purposes the equipping of the boy or girl with certain occupational experiences and information of a vocational guidance value. The experiences are gained largely by contact with tools, equipment and materials on constructive problems typical in part of actual shop conditions. The informational aspect is the resultant of the shop contact, plus selected material concerning the various occupations not included or gained under experiences."—R. H. Rodgers, Stout Institute.

Another aim of the prevocational period, intermediate schools and junior high schools, is to bridge the unfortunate gap that has so long existed in our educational system between the elementary and high schools.

It retains many of the methods of the elementary period and

at the same time introduces such methods of the high school as departmental instruction.

It aims further to meet the needs of many boys to whom the book methods of instruction do not appeal and give them the opportunity to develop along lines for which they have natural qualifications. This prevocational work should not, however, be segregated from other school work, but should be closely correlated with it.

Diversified courses in the prevocational period will undoubtedly begin the preparation of lifework for many boys, but it should not be assumed that all boys taking such work will go into the industries. As a "finding" period this scheme of industrial education "should be liberal enough to help those who can continue their school work to more wisely choose their courses in higher education, and likewise help those who find it necessary to leave school with a minimum amount of education to choose their respective occupations more intelligently."

2. *Scope of the Work.*

The work of this prevocational, or finding and try-out period, should be so organized as to be able to present a number of subjects typical of the chief industries not only of the community, but of the state, the nation, the world.

"It is the inherent right of every child that he shall have, before he leaves school, an insight into various important industries carried on not only in his own community but in the whole world."

—Rosana Hunter.

The introduction of prevocational education can not, of course, be the same in every community or school system. The character of the work must of necessity be limited. Rural schools can not be asked to do the same work as the city school. This would be preposterous.

Hence, the curriculum in small cities must be so reconstructed to suit the general school and community conditions. Just as many tools, pieces of science apparatus, books, photographs, etc., should be available in town or consolidated schools as the teachers could use effectively and the community would care to pay for.

In cities of 10,000 or more the following types of work might well be introduced in the course of study: drafting, electricity, plumbing, automobile work, brick-laying, tin-smithing, painting, mining, printing, blacksmithing, concrete work, machine shop practice, pattern-making, shoe-making, cabinet-making, carpentry, telegraphy, etc.

Other lines of shop work might be substituted for any of these, but such types should be selected which include some of the representative industries of the community or state.

Thus, we have an educational system with extensive aims spread over a variety of experiences for vocational acquaintance as contrasted with intensive aims concentrated upon a few subjects for the development of skill. In the prevocational, the experimental or try-out period, the former aim predominates.

Prevocational education should be broad enough to provide for both boys and girls subjects like salesmanship, office work, show-card writing and window-trimming. Housekeeping, catering, nursing, dressmaking, etc., should be included for the latter. All work should be made as practical as possible and suited to the needs of the industries of the community.

3. *Time.*

Adequate work can not be done on 60 or even 90 minutes per week. The schools shall never be able to show or satisfy the public who demand a dividend on their money, unless they get more time for their work. The experimental or try-out period (seventh, eighth and ninth grades) should offer, in cities of about 5,000 or more, four subjects per year or sixteen subjects in four years. The time devoted to each subject should not be less than one and one-half hours per day for nine weeks.

At the end of the ninth grade, the student, together with the instructor and parent, should decide what line of work to select and in which to begin training. For the remainder of the high school course the student should specialize in the subject which he has selected.

"Children will never be enabled to use their best powers in the service of the nation until school and industry, school and garden, school and workshop are associated allies in the task of education, with the family as third partner."—Dr. John H. Finley.

4. *Methods of Study and Presentation.*

The methods of presenting the work of prevocational education and the nature of the work presented may be classified in general into three classes: a, the participation or shop method; b, the observation method; c, the academic method.

4a. *The Participation or Shop Method.*

In presenting instruction for boys taking these vocational acquaintance courses, ample opportunity should be given to participate, so far as possible, in the industry studied. It is only by getting actual experience in the fields of work taken up that the

best results may be obtained. As this period aims primarily in gaining for the boys reliable information with which to judge the industries, a high degree of manipulative skill is not an absolute essential, yet good workmanship and care in construction should be the rule.

Actual experience should be given by repeated drill and practice upon certain operations that are true and typical to the industry under consideration and study if it is to have any vocational guidance or permanent value for the boy.

"The operations, however simple, should show the demand for standardization of parts in commercial practice, the adoption of special shop kinks, the use of jigs and automatic devices, and the development of uniform motions in working operations with the attainment of adequate speed."—G. F. Buxton.

4b. *The Observation Method.*

Not all industries can be studied exclusively by the participation method in the school shop. This should not be the case even though it were possible during this period.

There are, however, groups of industries in school communities which can not be duplicated or studied to advantage in the school workshop. They must be studied, if at all possible, by the observation method. Among the industries in this group belong steam engineering, paper-making, railroad engineering, the more advanced phases of the manufacture of automobiles, aeroplanes, motors, etc., boots and shoes, the textile industry, iron and steel, etc. For a study of the above group and other groups in which the pupils participate, trips should be taken to the mills, the factory or the railroad yards, for first-hand observation and information.

4c. *The Academic Method.*

Many of the industries can be studied by the participation and observation method; with some of these this is not possible. In either case an academic study of the industries should be correlated with the other two methods.

The academic method, vocational guidance or "occupational information" is used in making further study, investigations of the industries as to wages, needs and opportunities, character and possibilities of occupations, etc. Information is obtained and gathered from many places and presented in the form of lectures, slides and moving pictures, illustrations, lectures and reading.

5. *Vocational Guidance.*

To make the work of the prevocational preindustrial education entirely successful, the subject of vocational guidance should

be given considerable attention in order that the boy might be early set in the right way.

“As a part of the school system vocational guidance should be definitely organized and supervised. Small systems in cities of ten thousand should have an adviser devoting full time to the work; large city systems should have a supervisor with assistants in the several schools constituting a bureau.”

Vocational guidance should be a distinct function of the entire system belonging to all the departments, and continuing throughout the school career of the pupil. Special emphasis, however, should be given just before the child reaches the work age, or passes into the high school; and again in the senior year when the pupil is face to face with vital life problems.

Vocational guidance thus organized will concern itself with these problems:

1. The accumulation of information about vocations.
2. The imparting of information about vocations.
3. The direction of the education of the pupil to best serve his needs.

4. The introduction of vocational courses.
5. The prevention of leakage from schools.
6. The adjustment of the pupil to his life work.

“When the school systems assume the responsibility for the vocational guidance of the youth, they will be more practical, and much of the waste that characterizes the present methods will be eliminated.”—L. W. Bartlett, Pomona, Cal.

The following is an outline for vocational guidance or related “occupational information”:

- “1. What demands does the occupation make upon the worker?
 - a. Physical.
 - Peculiar abilities required.
 - Length of schooling. Accompanying financial burden.
 - b. Mental.
 - c. Moral.
2. What does the occupation offer the worker?
 - a. Chance for promotion.
 - Local or country-wide.
 - Organization of labor.
 - Steadiness of employment, etc.

- b. Health conditions.
- c. Moral conditions.
- d. Opportunities for recreation and self-improvement.
- e. Opportunities for service in the community."

(See "Vocational Information as a Part of Prevocational Work," by R. H. Rodgers, in the *Industrial-Arts Magazine*, p. 105, March, 1918.)

Related work in various studies, such as arithmetic, English (spoken and written, including reading and spelling), history, geography, science, hygiene, drawing and choral practice should be given special attention; together with the work as outlined above.

The reports of social, educational and industrial surveys contain much that may prove of help in gaining an accurate and detailed knowledge of many of our great industries.

Commercial pamphlets and catalogues have printed in them matter describing their products, the materials entering into the construction of these products, the processes involved in the transformation of the materials, how to do them properly, etc., which is of great value to the instructor of "occupational" information. Further information along this line can be learned from the pages of standard magazines, and technological journals, reports and bulletins issued by the various departments of education at Washington, D. C., and other cities and states.

Catalogues, booklets, handbooks, magazines, and books relating to many of the basic industries, should be found in every shop library. Every school board should lend financial aid in this direction, for the reason that such an equipment is fully as essential as tools, machinery and other shop equipment. They are the tools necessary for academic work in the prevocational period in that they assist in correlating with and vitalizing other school subjects.

Prevocational work is far wider in scope than many administrators recognize. Prevocational, pre-industrial education, like vocational educational education has to do with all vocations—commercial, professional, industrial, agricultural, household arts and other.

"Industrial education is one of the essential things needed to offset the monotony and specialization of modern industry, and to enable workmen to find and keep their jobs."—John R. Commons.

6. *A Plan for Small Cities.*

In cities where the departmental plan, junior high or prevocational plan has not been adopted and but one and one-half hours

per week is given to grade boys, the work has failed to interest the boys because of the long time between lessons. The boys lost track of their work.

This plan has always been very unsatisfactory and a change has been made in several manual training centers with good results.

The new plan consists in having one class come to the shop for eighteen consecutive days instead of the old way when the boys came eighteen times in eighteen weeks. This plan made for efficiency in quantity and quality of the work done and has a most wholesome effect upon the boy. The interest shown by the boys more than justifies the change from the old to the new.

The plan also does away with the purchase of much new material each year where the same had to be duplicated each time.

Under the old plan the boys in one class would often get their projects mixed with those of another. The new plan eliminates this condition entirely.

The girls in the same grades go to domestic science and sewing classes at the same time that the boys go to the shops, and the teachers of these departments report equally good results.

7. *Shop or Constructive Work in the Prevocational Period.*

Many types of constructive work might be arranged for in most cities of Colorado; among them occupations found in the woodworking industries, printing, metal work, cement, or electricity would be found the most profitable to include.

It is not the purpose of this pamphlet to outline in detail outlines of courses for each type of work that might be undertaken in any school shop. The guiding principles as outlined in the above chapters should be strictly adhered to, to insure the right standards of workmanship and secure for the pupil correct habits and industrial intelligence and appreciation that will make for universal service and leadership.

The junior high school, to be democratic, must be broad in its conception and include in its experiences true types of modern vocations, such as agricultural, manufacturing, commercial and to some extent the professional. Constant attention should be given to instruction, observation and manual action. Manual action or vocational experience with the concrete materials and processes of various vocations is worth infinitely more than any "amount of second-hand knowledge gained through reading or the advice of adults."

The junior high, if properly organized and handled, will show that all education should be closely related to vocational prepara-

tion and disclose the undeniable truth "that industry is the indispensable foundation of living, and of good living."

8. *Shop Exercises.*

The above analysis indicates that a period of required exercises, models, pieces, so often found in shop courses, do not and can not achieve the results desired.

In planning our work for the lower grades, let us not neglect to give opportunity for originality, constructive design, creative ability, self-reliance and the initiative.

In our desire to render aid and support to our government and do our bit in the shops, F. H. Shepherd, of the Oregon State Agricultural College, Corvallis, and assistant director of education and special training, Committee of Education, War Department, said recently with reference to making Red Cross, Y. M. C. A. and camp projects:

"I am wondering what more useful lessons could be given to boys than teach them to meet the demands of society for needed articles whether it be a baseball bat or an aeroplane.

"We must get away from the formal exercises and models of the schoolroom or our boys will never be trained, in school, to meet an unusual condition. An educated person is an unusual one, who is never nonplused in an unusual position, so training our boys to meet the demands of the present unusual conditions is surely adding to their education."

9. *Mechanical Drawing in the Grades.*

The drawing of plans, designing, sketching, drafting, blue prints, reading, working, drawing or plans, etc., is necessary to the efficiency in any line of shop work. Mechanical drawing is the basis for all shop work and is essentially its reading or primary course.

Mechanical drawing in the grades, although it is not as formal as that of the high school, yet it should be as carefully taught as any other subject in the curriculum.

The best results to be obtained during this period is to spend about eight, nine, ten or twelve weeks in mechanical drawing before any work in the shop is attempted. All shop exercises should be preceded by a carefully executed working drawing of the same.

A VOCATIONAL EDUCATION

1. *Definition.*

- (a) "Vocational education (training) is any form of education (training) that equips the individual with a marketable skill."

- (b) "To give knowledge and skill of direct value upon immediate entrance into the trades or trade."

2. *Period.*

Senior high school grades 10, 11 and 12.

3. *Function of the Senior High School.*

If the junior high school is to be truly and thoroughly prevocational, its promise is that the senior high school will furnish the basis for suitable choice of curriculum and that choice should be the opportunity for specialized training in some one or more vocations. Hence, the final choice of the pupil leaving the prevocational should be vocational in aim. The pupil should come from the junior high school with a fair idea of choice. In the senior high school the student should pursue his work in the chosen field.

Courses can not be general and special at the same time. Under the usual system of the general or cosmopolitan high school, where everything is based upon subject or subject-department, the present educational values—social, individual and disciplinary—as indicated by their order, can not be attained unless reorganization upon a curriculum basis takes place.

The curriculum or sub-school should have for its function a particular purpose and should represent in miniature the separate special school which attempts a single purpose.

In the place of objectiveless courses with confused and undefined aims, specialized courses must be offered that have a direct relation with all vocations—commercial, professional, industrial, agricultural, domestic economy, etc. Such a system of education would entirely eliminate the present erroneous assumption, that the student who chooses the college preparatory course can make no mistake.

Curriculums in the senior high school "should be those which lend themselves to the resources and organization of the school, which involve a social utility that is undisputed, which meet demands for considerable recruits—which are suitable to the ages and capacities of the high school pupils."

The change from the old (general education) to the new (specialized types of instruction) can not be immediately abandoned because of present controlling convictions, conservative tendencies, student traditions. Present teachers and equipment in many schools are also unsuitable for specialized purpose.

Changes, however, to meet the demands for vocational education, with its feature of specialization in the senior high school, are being made the country over, in order that they might answer the provisions of the Smith-Hughes Act.

4. *The Smith-Hughes Act.*

The Federal Board for Vocational Education has announced in an official document its definition of vocational education:

"To the extent that it is subsidized by the Federal Government under the Smith-Hughes Act, vocational training for the common wage-earning employments. It may be given to boys and girls who, having selected a vocation, desire preparation for entering it as trained wage-earners; to boys and girls who, having already taken up a wage-earning employment, seek greater efficiency in that employment; or to wage-earners established in their trade or occupation, who wish, through increase in their efficiency and wage-earning capacity, to advance to positions of responsibility.

"The guiding principle of the newly-created system of vocational education is announced to be that 'the education to be furnished must be under public supervision and control, designed to train persons for useful employment, whether in agriculture, trade and industry, or home economics.' "

Prior to December 1, 1917, the plans for vocational education of twenty-two states had been approved. At the regular meeting of the Federal Board December 14, 1917, the plans of eighteen additional states were considered and approved and these states were certified to the Secretary of the Treasury as having complied with the terms of the law entitling them aid. Among these states was Colorado.

The state apportionment of the Federal fund for vocational education for 1918-19 was announced at this writing. The total amount distributed to the various states was \$2,307,460, and each state participating has appropriated for vocational education an amount equal to its share. The amount allotted to Colorado is \$19,273.

The Colorado Agricultural College, at Fort Collins, has been recognized as the institution where teachers are to be trained for vocational work.

The academic work taken in connection with vocational training must be closely related, not non-vocational in character, as is so often the case in technical high schools and commercial courses.

5. *Time.*

Under the curriculum plan the time given purely to technical

or vocational work, to related technical and to general or non-vocational subjects, will be governed largely by the credit system for diplomas in vogue in various communities. However, concentration and specialization in some field is necessary in the third and fourth years if efficiency standards are to be achieved by the student.

About one-half of the required school time should be devoted to specialized, technical or vocational work; another fourth should be given to the related technical subjects, such as industrial history and geography, science and physics, economics, commercial law, commercial and shop mathematics, materials, commerce, a modern language, written and oral English, etc. Another fourth may be general. English and civics is the usual requirement in most communities, and the choice of subjects is necessarily limited by convention. Under this plan the pupil will be able to meet the minimum requirements of the diploma.

But in our desire for specialization we must not adopt a system of Prussianism in education in this country, for it should also be our plan in training our youth for a democracy that we give due condition to the development of real character and independence of thought and action. We must not only teach our boys and girls how to make a living, but awaken in them an appreciation of the things that make life worth while.

Therefore, "additional opportunity for wider choice should be made and the students encouraged to do something outside the limits of specialization and convention. The idea of the avocation, the opportunity for doing something for reasons other than those of utility, should be encouraged in an age where the idea of utility is exalted. The vocation must receive emphasis, to be sure, but we ought not to erect barriers against the instinct for the unusual, the now useful, the abstractly artistic."

The finished product of our schools should possess the qualities of intelligence, industry, public spirit, health, domesticity, politeness, taste and righteousness. These are the elements which, when properly fused in the caldron of public education, will reach their ideals of Americanism to the uttermost parts of the world and stand as memorials to the end of time.

6. *General Education in Small Cities.*

In most of the cities of Colorado, the separate trade school is impracticable. The vocational training offered in the junior and senior high can, however, be made valuable to the students who find it necessary to go to work immediately after leaving school.

Another school that meets the demand of small cities is the "General Industrial School," whose "aim is to give each boy some practical shop experience in a number of trades selected with a view to meeting local industrial conditions, so far as possible. The shopwork is accompanied by instruction in related technical subjects, including drawing, mathematics, and science, together with instruction in language, civics, physical training and other subjects necessary to a well-rounded course."

The Federal Board for Vocational Education must be consulted for its policy in considering a plan for vocational education in small cities.

C. Other Educational Endeavors, Schools and Enterprises in the United States for Training its Citizens Along Industrial Lines.

The following are types of schools that are receiving considerable attention and support in many cities and states:

1. The Trade School, whose chief aim is to give instruction in different trades and which will lead immediately to technical skill and employment in the occupation chosen. It gives little attention to the broader side of education. It prepares for immediate induction into the industrial world.

2. Continuation Schools have been adopted in many states and have met with unusual success. Like the Part-time Co-operative Courses, continuation schools aim to give instruction along industrial and general educational lines and meet the needs of young and old not regularly enrolled in the school system. Under these forms of instruction, pupils and students are able to continue along their regular lines of employment. In some states attendance in continuation classes is compulsory.

3. Short-unit Courses are devices for effectively meeting the needs of certain groups of workers already in the trade and others of the community. "The short-unit or brief course is an intensified form of instruction which is intended to serve in a limited number of lessons a specific need of a particular group. Each unit deals with one part of the trade or interest and is complete in itself. The subject matter is selected with reference to the need of the group rather than its relation to other parts of the trade." These courses are conducted for brief periods during the day or evening.

4. Apprenticeship Courses are generally conducted by manufacturers in their own plants for the benefit of their employees. Many changes have been made from the old-type apprenticeship

course in that employees are given academic instruction along with their practical experience.

5. The Smith-Sears Bill provides for such re-education of our returned army as is necessary to restore them to civil employment. It carries an initial appropriation of \$6,000,000. Vocational instruction and rehabilitation is now being provided for the soldiers, sailors and marines at some of the nation's larger hospitals.

D. Americanization.

According to the last census the United States has more than 4,600,000 inhabitants over twenty years of age who cannot read or write. How to train the thousands of illiterates now in the army and soon to be drafted is a mammoth problem.

Along this line Mr. Ernest E. Cole, assistant superintendent of the Chicago schools, says the following:

"Illiteracy and democracy cannot exist together, and education must prepare the way."

City Superintendent Emeritus Dr. William H. Maxwell, in his last report as superintendent of public schools, states that two pressing national needs have been disclosed by the war: "more trade schools and more thorough Americanization of foreigners." "The first lesson taught by this war is the need of more trade schools and continuation schools," is the opening paragraph of the report. He says, "the time is past for the theoretical discussion of the advantages of teaching trades. The stern hand of history has shown us that an untrained people is a people undeveloped economically, physically and morally. There is no room in our country today for those who are not fitted for some definite calling. Our nation needs the intelligent, well-trained effort of every man and woman within its borders. While some may render this service in the professions or in trained scientific, commercial and other industrial pursuits, the great mass of the people must render it in the various trades. Although we realize that it is a blot upon the honor of illiterates among the inhabitants, and consequently appreciate the importance of compulsory education and child labor laws, we have not realized, as yet, that it is just as much a matter of reproach to have a large number of persons who can read and write, but who are not fitted for any particular kind of work. Is it not a fact that the so-called Industrial Workers of the World consist almost entirely of persons who have no trade? Could such an organization be formed among the skilled workers?"

"A poor workman quarrels with his tools, and poor tools make quarrelsome workmen. When we train a man for his work he be-

comes a better citizen. Hence vocational education is the foundation of good citizenship."

E. *Doing Our Bit in Manual Training During War.*

The following question came to the editorial staff of Industrial-Arts Magazine recently:

Q.—"Through what general types of activities can manual training departments in elementary and high schools do their bit during the present war emergency?"

A.—"The desire of manual training departments to be of direct service during the present war has manifested itself in a number of distinct lines of activity:

"First, the departments have tried to produce articles that are of distinct war utility. These articles have included: (a) furniture and fittings for Y. M. C. A. buildings and for the recreation buildings in army cantonments; (b) games and other articles for personal use of soldiers; (c) interior furnishings and hospital equipment for the Red Cross, and (d) articles of furniture such as cutting and work tables, chairs, folding chairs, packing boxes, yarn winders, sock stretchers and other articles for the use of the Red Cross chapters.

"A second type of work has been in the direction of the manufacture of furniture and equipment for school use. The idea has been to make articles which cannot readily be bought in the market and the purpose has been to conserve labor and materials and to reduce the school expenditures which have grown enormously through the increased cost of all labor and materials.

"A third means of service has been the manufacture of simple devices and articles for local community use. In some cities the boys have put up signboards for war savings and Liberty Loan campaigns, they have built fences around war gardens and they have made markers, etc.

"A fourth way in which the manual training department can do its bit is to make articles for Red Cross sales and for Christmas sales, the profits to be devoted to some form of war work. Under this head schools in many parts of the country have made thousands of puzzles, small toys and articles of furniture which they have sold to the local people at considerable profit. In some communities the boys have undertaken jobbing work, including the repair of chairs, caning, etc. The profits have been employed to buy war savings stamps or have been given to the Red Cross."

F. *War Work Suggestions and Activities for the Grades and High Schools.*

NOTE: Do not spend money to make things in quantity for the Red Cross until you are assured they will be wanted. Do not send things that have been made until you have reason to know they will be gladly received. And do not expect the Red Cross to pay for the materials you use unless official assurance has been given.

Checker Boards from paper and cardboard.

Paper Dolls to be presented by our Sammies to refugee children or placed in the pockets of dresses to be shipped abroad.

Scrap Books.

News Clippings of interest to our soldier boys.

Knit Small Squares, 4-inch, for baby booties or afghans.

Portfolios for Stationery of heavy paper and cardboard.

Address Books to go with portfolio.

Stamp Books to go with portfolio.

Calendar and Blotter Pads to go with portfolio.

Pin Balls.

Needle Cases.

Knitting needles of dowels or willow.

Map or Picture Puzzle of thin wood or cardboard made with coping saw.

Dominos of cardboard or wood with box.

Checker Board and Men of heavy cardboard or wood with case.

Solitaire Board.

Cribbage Score Board.

Sewing Problems for hospitals and refugees, as outlined in the Red Cross pamphlets.

Gun Wipes.

Sewing Problems for the girls.

Ambulance Pillows.

Sewing Problems as suggested in A. R. C. pamphlets.

Knitting Problems as suggested: wristlets, mufflers, socks, etc., for the girls.

Packing Cases for Red Cross, 24"x24"x36" outside measurements, of wood $\frac{5}{8}$ " or $\frac{3}{4}$ " thick. Ends reinforced.

Reel for winding yard (see A. R. C. 400).

Stocking Knitting Frame (see Industrial Arts Magazine Feb., 1918).

Chess Board and Men, of round discs, with the men drawn or printed on.

Ring Toss Games.

Bean Bag Games.

Ping Pong Sets.

Box Ball Sets.

Case or Box for above.

Mechanical Puzzles.

Splints of basswood and yucca pine wood (cut according to Red Cross specifications: length $17\frac{1}{2}$ ", width $3\frac{1}{4}$ ", thickness $\frac{3}{32}$ ").

Crutches (from models obtained from drug store).

Hospital Trays.

Stretchers (according to military specifications).

Convalescent Canvas Chairs.

Back Rests for convalescent patients (flat boards 32" long, 18" wide and $1\frac{1}{2}$ " thick).

Bedside Chart Holders.

Bed Trays.

Bed Cages.

Bedside Tables.

Baseball Bats.

Jumping Standards.

Bird Cages for Y. M. C. A. Buildings.

Flower Boxes for Y. M. C. A. Buildings.

Chess Men (turning problems).

Tongue Depressors.

Joke Books.

Drill Guns (for junior and senior high schools).

Street Signs for smaller communities.

War Garden Hot Beds (by C. E. Durst, Circular No. 215, published by the Agricultural Experiment Station, University of Illinois, Urbana, Ill.).

Yarn Holder.

Yarn Winder

Back Yard Chicken Coops.

Rabbit Hutches.

Other Poultry Problems.

Dog Houses.

Red Cross Problems for the local chapter, such as: screens, lounging chairs, card tables, cutting tables, blackboard for instructors, etc.

Dressing Tables.

Taborets.

Benches.

Lamps.

Folding Tables.

Andirons (Bessemer steel or iron).

Spark Screens (iron frame, wire mesh).

Shades (parchment or fabric; color as per sample).

Ink wells and Blotter Ends (wood printed; glass wells; color as per sample).

Garden Markers.

Trays for dehydrating fruits, vegetables, etc.

Garden Tools.

Individual Boxes (for use in base and post hospitals).

"Foot Locker," to slip under bunks of soldiers and hold some of their personal belongings (15" wide, 13" high and 30" long, outside measurements).

Indian Clubs.

Carom Boards.

Shuffle Boards.

Checkers can be made of shotgun wads and colored with ink.

Indoor Quoits.

Ping Pong.

Bowling Green Balls.

Bag o'tell.

Swinging Flower Boxes.

Dumb Bells.

Bee Hives (save sugar).

Kitchen Safes.

NOTE: See past issues of the Industrial-Arts Magazine, Manual Training Magazine and other publications. Watch what the Federal Board of Vocational Education, the United States Department of Education, the War Department and other departments at Washington are doing at this time. Watch for their publications.

G. Other Timely Educational War-Time Activities and Problems.

Introduce Welding in your school.

Automobile repair work.

Tractor engineering.

Farm mechanics in small towns.

Toy making.

Train War Registrants in your schools.

Make repairs of all kinds.

Wireless Telegraphy.

Magneto Assembling.

Commercial or Industrial Art and Design.

Show Card Writing.

Have Night Schools.

Evening Trade Schools.

Summer Schools.

Modeled Leather Work.

A Cobbling Class. (Teach boys to keep their shoes in repair and those of the athletic teams.)

Night Schools for Drafted Men.

War emergency courses conducted by the Public School system in factories and commercial houses.

Make munitions in the high school where equipped for such work.

Urge boys to join and become members of the Boy Scouts of America.

Introduce a plan for home industrial work.

Heed the President's call for the Boys' Working Reserve.

Turn shops over to the treating of soldiers on their return.

Introduce "Print Writing," as England has done in her schools and found most successful.

Take advantage of the Smith-Hughes Law and have vocational education in your high school.

Let the high school manual training department build your gymnasium, playground apparatus, etc.

All boys and girls should join the U. S. School Garden Army to increase and conserve food products.

Printing classes can print the President's messages and addresses dealing with the war for use in the grades and high school.

Aid in preparing supplies for the soldiers and their homeless families.

Save your tracing cloth for the Red Cross.

Cut Stencils for letters and figures for use in the school for sign making and painting numbers on class-room doors.

The bookbinding class should repair torn books of the school.

Educational opportunities in vocational and industrial education should be offered to girls and women in our schools.

Vulcanizing Course.—Boys can repair the automobile tires for their fathers, their own and others.

Soldering Course.—Boys should learn to solder all tinware about the home or that of the domestic science department.

Machine Shop classes can make miniature models of warfare, such as cannons, tanks, etc. Others can build diminutive bridges, trenches, etc. Manual training should also function in the home.

The experience obtained in the school workshop should find application about the boy's home.

Kind of Work.—Soldering, vulcanizing, cement sidewalks, cobbling, furniture repair, caning, window shade repairs, shelf-making, toys for younger members of the family, picture hanging, book repairs, leaking gas jets, the use of asbestos, varnishing floors and furniture, painting and mixing of paints, glazing, electric bell work (batteries, wiring, etc.).

Occasionally use the communitive plan, group plan or factory plan of production in your manual training classes. Use jigs, etc.; have a foreman, etc., for each group.

Make shop safety devices.

Use Industrial Slides.

Have lectures in your school by artisans and professional men.

INDUSTRIAL ARTS IN RURAL SCHOOLS

Perhaps the greatest consideration in this pamphlet should be given to our rural schools, for the reason that they are not always able to receive the careful guidance and help from trained specialists and teachers of industrial arts. Then, too, these schools do not possess the facilities, equipment and means to carry on successful manual training, as is the case with a well organized city school system, with its greater financial support, better buildings, etc.

Even though such conditions exist that apparently hinder her progress in industrial education, there are, indeed, splendid opportunities at this time for the rural school in which to render a most praiseworthy service.

In the smaller schools and poorer districts, workbenches can be made by the boys themselves. To be sure, the making of a workbench is a splendid problem for any boy in any school, workshop, or home. Plain benches can be constructed from common lumber or heavy packing boxes to which a vise-screw can be fastened. The latter can be purchased for about \$1.50.

As to tools—some of these can be obtained from home by the pupils and the rest purchased by the school board. Funds can be raised for necessary manual training equipment, by giving some performance, operetta, playlet, etc., that has been arranged by the pupils and their teacher. Patrons of a community are always willing to give their support towards a worthy cause in this fashion. The objection to be found with tools that might be brought

from home is that they are of an old pattern and often useless for effective workmanship.

In outlining a course for rural school manual training, one must consider at all times the needs of the community and that the work undertaken should touch the life of a boy in his work, play, school and home. Exercises and problems should be selected which will enable pupils and students to secure further training through designing and constructing things of practical use and service in their home and on the ranch. Manual training carried on in the right way by a tactful teacher, will be found to inspire pupils with greater enthusiasm for all school work in general. The thoroughness, accuracy and attention to detail insisted upon in this work, react admirably upon the character of the students.

As to courses of study and projects, do not have hard-and-fast rules. Select projects and processes that are adapted to the ability of the pupils at hand and that awaken interest and are serviceable.

In township schools and country high schools, the students should be taught to work with a number of materials, with "farm mechanics" as the principal thought of instruction.

The one big thing that comes to the author at this time, in order that our boys of the country school may have a part in winning the war when the price of materials are high and labor is short, is a "farm implement hospital."

Manual training shops equipped for woodworking and iron work can give prompt and efficient service to farmers within a radius of twenty miles in repairing farm machinery of all kinds. Such an implement hospital could be kept running during the summer months, when the wear and tear on farm machinery is greatest. Farmers should be asked to pay for all materials used and meet all other expenses involved in the repair of their farm implements.

SUGGESTED PROBLEMS AND PROCESSES FOR RURAL MANUAL TRAINING CLASSES

- | | |
|----------------------------|-------------------------------------|
| 1. Setting posts. | 2. Building fences. |
| 3. Planting trees. | 4. Oiling harness. |
| 5. Pruning trees. | 6. Mending with rivets. |
| 7. Mending harness. | 8. Caring for farm and other tools. |
| 9. Protecting trees. | 10. Putting handles in tools. |
| 11. Nailing on horseshoes. | 12. Sharpening plows. |

- | | |
|------------------------------------|---|
| 13. Mixing mortar. | 14. Laying stone wall. |
| 15. Laying cement walk. | 16. Hanging doors. |
| 17. Setting locks. | 18. Mixing paint and glazing. |
| 19. Building roads. | 20. Putting culverts in roads. |
| 21. Gluing. | 22. Soldering. |
| 23. Knot tying. | 24. Harnessing, hitching, and unhitching horses. |
| 25. Lubrication of farm machinery. | 26. Care and running of gas engines. |
| 27. Simple forging, welding. | 28. Grinding and sharpening edge of tools, mowers, binders, sickles, etc. |
| 29. Pipe work. | 30. Belt lacing. |
| 31. Gas Tractor operation. | |

LIST OF AGRICULTURAL PROBLEMS

Tool chest	Stepladder	Milk tool
Nail box	Whiffle-tree	Wagon jack
Bench hook	Beehive	Wheelbarrow
Neck yoke	Wash bench	Farmer's level or plumb
Three-horse evener	Clothes rack	Forcing box
Clothes stick	Rabbit trap	Hand cultivator
Concrete forms	Bird house	Chicken coop
Fly traps	Corn dryer	Gate
Seed-testing box	Cattle rack	Wagon box
Corn rack	Hog rack	Wagon feeding trough
Sheep-feeding trough	Portable hog house	Road drag
Hayrack	Table for milk tester and other purposes	Hothouse
Dog house	Cold frame	Sack frame
Tree pruner	Oats sprouter	Nests for laying hens
Hotbed	Kitchen cabinet	Trellis, rowmarker
Water trough	Potato marker	Flour box
Chicken crate	Carpenter's vise	Wood and kindling box
Shrub label	Rabbit hutch	Box furniture
Fireless cooker	Poultry house	
Chicken brooder	Miter box	
Hammer handle	Workbench	
Sawhorse		

To these might be added other problems for the shop, poultry yard, seed corn, yard, the farm house, garden, stock, barn yard, bees, concrete work and other miscellaneous needs.

SHOP EQUIPMENT SUITABLE FOR INDUSTRIAL ARTS WORK IN RURAL AND SMALL TOWN SCHOOLS

(a) Woodworking Tools for a Rural School Shop:

- 1 No. 5 Bailey jack plane.
- 1 22-inch 10 point, crosscut hand saw (Disston or Atkins) No. 63.
- 1 22-inch 8 point, rip saw (Disston or Atkins) No. 65.
- 1 No. 915, 10-inch Sweep Stanley ratchet brace.
- 1 $\frac{1}{4}$ -inch, $\frac{1}{2}$ -inch, 1-inch and $\frac{3}{4}$ -inch (Russel Jennings or Irwin) augerbit.
- 1 Clark's expansive bit No. 2.
- 1 Rose counter sink.
- 1 No. 101 Goodell reciprocating drill.
- 1 $\frac{1}{8}$ -inch, 5-32-inch, 3-16-inch, 7-32 inch and $\frac{1}{4}$ -inch drills.
- 1 No. 51 Stanley spoke shave.
- 1 No. 71 $\frac{1}{2}$, Buck Bros. 8-inch drawing knife.
- 1 No. 35, Buck Bros. chisels, $\frac{1}{4}$ -inch, $\frac{1}{2}$ -inch, 1-inch.
- 1 Hickory mallet, 2 $\frac{1}{2}$ -inch by 5-inch.
- 1 No. 12 Maydole hammer.
- 1 Champion screwdriver, 8-inch.
- 1 Monkey wrench, 8-inch.
- 1 No. 25, 8-inch Stanley bevel.
- 1 No. 65 Stanley marking gauge.
- 1 Eagle pencil compass No. 576.
- 1 2-inch Combination oil stone (unmounted), 7-inch.
- 1 Oil can.
- 1 All bristle 9-inch duster.
- 1 Iron bench screw, 1 $\frac{1}{8}$ x12.

The total cost of the above equipment in 1915 was \$14.40. Since then, on account of the war, the same has increased by perhaps 33 1-3%.

SHOP EQUIPMENT

(b) Tools for General Blacksmith Work:

Elementary shop and practice work and repair work in iron and cement would make a very desirable line of work for such a shop. For this work the following equipment would be required:

- 1 18-inch hand-blown forge.
- 1 kit of blacksmith's tools:

- 1 14-inch tongs,
- 1 cold chisel,
- 1 hot chisel,
- 1 hardie,

- 1 blacksmith's hammer, 2 lb.
- 1 10-inch pinchers.
- 1 blacksmith's anvil (Hay, Buddon or Trinton).
- 1 hand drill press.
- 1 3½-inch mechanic's vise (Reed).
- 1 No. 10, all steel tinner's snips.

Total cost in 1915 was \$28.60. See catalogs for present prices.

(c) Tools Needed for Simple Cement Work:

- 1 mixing hoe.
- 1 shovel, No. 2 square point, D handle.
- 1 10-inch Cincinnati pattern plastering trowel.
- 1 10-inch Rose pattern trowel.
- 1 5-inch pointing trowel.

Total cost in 1915 was \$2.80. See catalogs for present prices.

The boys and teachers should make all mixing troughs and bins needed for the cement work.

(d) Soldering:

- 1 Gasoline torch, \$3.50.
- 1 "Nokorode" Soldering Kit:
 - 2 oz. box "Nokorode,"
 - Soldering Iron,
 - 1 Handle,
 - 1-oz. String Solder.
 - 1-oz. roll friction tape.
 - 2 strips emery cloth,
 - Wooden case.

Entire Outfit, \$1.00. Directions included with the outfit. For sale by local dealers.

(e) Painter's Tools:

- Oval brush, No. 8.
- Varnish brush, 2-inch.
- Varnish brush, 3-inch.
- Wall brush, No. 6.
- Glass cutter.
- Putty knife.
- Sash tool, No. 2.

FURTHER HELPS FOR TEACHERS OF MANUAL TRAINING IN RURAL SCHOOLS

Charts of tools, catalog, etc. (free)—Stanley Rule & Level Co., New Britain, Conn.

Charts of files, saws, booklets on sharpening saws, etc. (free)
—Henry Disston & Sons, Inc., Philadelphia, Pa.

A Simple Trap Nest for Poultry, Farmers' Bulletin No. 682,
U. S. Dept. of Agriculture.

The Road Drag and How It Is Used, Farmers' Bulletin No.
597, U. S. Dept. of Agriculture, Washington, D. C.

Wood Finishes for Manual Training Schools, The Marietta
Paint and Color Co., Marietta, Ohio.

Manual Training School Equipment, Benches, Tools, Sup-
plies, etc., Catalog, Belcher & Loomis Hardware Co., Providence,
Rhode Island.

Furniture for Amateur Craftsmen (Cypress Library), South-
ern Cypress Mfrs. Ass'n., New Orleans, La. (free).

The Proper Treatment for Floors, Woodwork and Furniture,
S. C. Johnson & Son, Racine, Wis. Also send for Portfolio of
Wood Panels (free).

Simonds Manual Training Series: No. 1, Booklet, "The Pro-
fessor and the Saw." No. 2, Charts, set of Educational Blue-
prints. No. 3, Booklet, "How to File a Hand Saw." No. 4, Plans,
Specifications, and Tool Equipment for Manual Training Depart-
ment (free). Series No. 4 contains two blue prints of "Bench
Plan for Group of Six Pupils, Bench Plan for Individual Pupils,"
with instructions for making—Simonds Mfg. Company, Fitch-
burg, Mass.

A sample of the Griffin coping saw blade and printed circular,
John H. Graham & Co., 113 Chambers Street, New York.

The Use of Paint on the Farm, Farmers' Bulletin No. 474,
U. S. Dept. of Agriculture.

The Repair of Farm Equipment, Farmers' Bulletin No. 347,
U. S. Dept. of Agriculture.

Quarterly Bulletin of Milwaukee School of Agriculture and
Domestic Economy, Vol. 4, No. 4, Feb., 1915, Wauwatosa, Wis.

Laboratory Exercises in Farm Mechanics for Agricultural
High Schools, Farmers' Bulletin No. 638, U. S. Dept. of Agricul-
ture.

Farm-and-Home Handicrafts Club Projects (20), issued by
the Oregon Agricultural College Extension Service, Corvallis,
Oregon.

"When the City Boy Goes to the Farm," a set of Farm Craft
lessons (22 in number)—U. S. Boys' Working Reserve, Depart-

ment of Labor, Address office of Federal State Director, Illinois State Council of Defense, Room 47, 120 W. Adams Street, Chicago, Ill.

FURTHER HELPS

Farm-and-Home Handicrafts Club Projects—State Club Leader, Oregon Agricultural College, Corvallis, Oregon.

Home-made Fireless Cooker, Farmers' Bulletin No. 771, U. S. Dept. of Agriculture.

Good book for beginners—Essentials of Woodworking, by Ira S. Griffith, 75c, Manual Arts Press, Peoria, Ill.

Farm Home Conveniences—Madge V. Reese, Farmers' Bulletin 927, U. S. Dept. of Agriculture, Washington, D. C.

Send for Catalogs:

"Books on the Manual Arts"—a bibliography listing and describing 400 books (mailed free). The Manual Arts Press, Peoria, Ill.

Mechanics Handbook, Millers Falls Co., Millers Falls, Mass.

"Yankee Tool Book," North Bros. Mfg. Co., Philadelphia, Pa.

Manual Training Catalog, E. C. Atkins & Co., Inc., Indianapolis, Ind.

Carborundum Pocket Stone and Complete Catalog, The Carborundum Co., Niagara Falls, N. Y.

Good Journals:

Industrial Arts Magazine (monthly), \$2.00 per year, The Bruce Publishing Company, 129 Michigan St., Milwaukee, Wis.

Manual Training Magazine (monthly), \$1.25 per year, The Manual Arts Press, Peoria, Ill.

BOOKS CONTAINING FARM PROBLEMS

The following books contain small problems for the making of useful articles used about the farm and the farm home: Roehl's Agricultural Woodworking, \$1.08, Bruce Publishing Co., Milwaukee, Wis.; Blackburn's Problems in Farm Woodwork, \$1, Manual Arts Press; Brace's Farm Shopwork, \$1, American Book Co.; Handy Farm Devices and How to Make Them, \$1.50, Orange Judd Co.; Farm Appliances, 50c, Orange Judd Co.; Farm Devices, \$1, Orange Judd Co.; Bulletins (Cypress Library) of the Southern Cypress Association (free), New Orleans, La.; Farm and Home Mechanics (free), Southern Pine Association, New Orleans, La.; A Hundred Handy Helps for the Farmer and His Home (free),

Southern Pine Association; Dewey's Series of Farm Projects, L. C. Dewey, Denver, Colo.; Ramsower's Equipment for the Farm and the Farmstead, \$2.25, Ginn & Co.; Manual Training for Rural Schools, by Louis M. Roehl, 35c, Bruce Publishing Co., Milwaukee.

SMALL BUILDINGS

Roehl's Agricultural Woodworking, \$1.08, Bruce Publishing Co.; Powell's Farm Plans and Out Buildings, \$1, Manual Arts Press; French & Ives Agricultural Drawing and Design of Frame Structures, \$1.25, Manual Arts Press; Farm Buildings, \$2, Manual Arts Press; Eckblaw's Farm Structures, \$1.75, Macmillan Co.; Hopkins' Modern Farm Buildings, \$3, Webb Publishing Co.; Poultry Houses and Equipment, 25c, Webb Publishing Co.; Poultry Houses and Fixtures, Reliable Poultry Journal; Making a Poultry House, 50c, John McBride Co.; Fiske's Poultry Architecture, 50c, Manual Arts Press; Practical Country Buildings (free), (Trade Extension Department), Northern Hemlock and Hardwood Mfrs. Association, Oshkosh, Wis.; Swine Houses (free), National Lumber Mfrs. Association, Chicago; Poultry House Construction, 5c, United States Department of Agriculture; Plans and Suggestions for the Arrangement of a Modern Milk House, (Farm Products Division) Borden's Condensed Milk Co.; Eckblaw's Grain Storage Buildings, National Lumber Mfrs. Association; Eckblaw's Implement Sheds, National Lumber Mfrs. Association; Construction of the Dairy House, Bulletin of the University of Illinois; Hog Houses, 5c, United States Department of Agriculture; Smaller Farm Buildings, Southern Pine Association.

PROBLEMS IN CONCRETE

Concrete in the Barnyard, Universal Portland Cement Co.; Small Farm Buildings of Concrete, Universal Portland Cement Co.; Concrete Silos, Universal Portland Cement Co.; Concrete Construction for Rural Communities, \$2, McGraw-Hill Book Co.; Hansen's Concrete Silos, \$1, Cement Era Publishing Co.; Concrete Fountains and Lawn Ornaments, 50c, N. W. Henley Publishing Co.; Campbell's Concrete for Home and Farm Shop, 75c, N. W. Henley Publishing Co.; Kind's Silos, 50c, Webb Publishing Co.

ADDENDA

1. The introduction of greater variety in shop equipment, processes and materials is regarded as essential if the proposed aims of prevocational and vocational education are to be realized.

2. No teachers should be employed for any types of industrial education who are not fully prepared through scholastic training and experience to teach the same.

3. Under one deputy superintendent should be centered the responsibility for all activities in the manual training arts, vocational guidance, and vocational education.

4. Under the immediate direction of this deputy superintendent should be grouped a staff of trained directors of special subjects, including at least (a) fine arts, (b) home economics, (c) manual training, (d) prevocational, vocational, including vocational guidance.

5. A state paper of four pages printed on plain paper, should be issued every month from the office of the State Superintendent of Public Instruction in the interest of industrial arts teachers. Said paper need not be larger than 11"x15" and all printed matter could be arranged after the fashion of our modern newspaper.

All subject matter should have direct bearing on manual training, prevocational and vocational education. The department of home economics could also be given recognition and space in this paper.

The paper should aim to aid especially teachers in need of advice, those who desire to be further enlightened on the work in hand and the field of industrial arts in general.

Letters of special interest and those instructive in character should find a place in this paper.

Space should be given to a review of important happenings, legislation, publications, meetings, etc., along the line for which the paper is intended.

The editing of the paper should be placed in the hands of some competent person or persons appointed by the State Superintendent of Public Instruction.

Copies of said paper should be mailed to every instructor of industrial arts, principal and city superintendent within the State of Colorado.

GOOD ROADS

Since the public roads so closely affect our commercial conditions and our social and educational environment, there is every reason why the school boy and girl should be impressed with the importance of good roads, and be given an understanding of the elementary principles of road administration and construction.

A road is the means of internal communication and transportation between points in any country—a place where one may ride or drive; it is an open way appropriated for public passage and travel, for wagons or other vehicles, and is necessary to the good of every community.

Pupils in our public schools must be instructed in the elementary principles and practices of road-making, the beneficial effects of good roads to a community, and such other information on the subject of road construction and maintenance as will better fit them as men to help solve the perplexing road problem, now attracting the attention of our national, state and civic governments.

WHAT IS A ROAD?—The origin and extension of roads. Explain the “trail” or “foot-path” of the pioneers and how they were evolved, by demand of traffic, into the wagon earth-road, the corduroy road, the plank road, charcoal road, gravel road, rock road, and on to the brick and concrete roads of today. What are state roads, county roads, neighborhood roads?

VALUE OF GOOD ROADS.—What permanently improved roads, of whatever class, mean to a state, a county, a rural community. The spiritual, moral, social, commercial and educational benefits of good roads to the country neighborhood, and incidentally to the city. How it affects the rural mail delivery. How the purpose of good roads construction is to leave the imprint upon the child-mind—the man, contractor and road-builder of tomorrow—that good roads are an absolute necessity and must be built, as a church or school house must be provided for the public good.

WHAT MAKES A GOOD ROAD?—The proper location. Explain location. Why a map of a road is made and recorded. The necessity of a profile, and how a profile is made; its necessity in intelligently estimating costs. Explain the grade percentages and how they are determined, and show by tables and charts the great loss in hauling over steep grades, and why and how steep grades should be reduced.

DRAINAGE.—The vital importance of drainage to any road—earth, wooden or metal surface. What drainage means—the proper methods of diverting or carrying off surplus surface water with the least damage to a roadway. Explain sub-drainage, and what causes necessitate sub-drainage in certain places and under certain conditions. Waterways or outlets—how to estimate required sizes of culverts or bridge openings to carry off natural water courses or rainfalls, etc. Drain ditches, side ditches, berm ditches. The importance of drainage to properly “crowned” road-beds.

CROSS-SECTION.—Explain the cross-section of a roadway. Its relation to the profile of the length of the road. Explain the various terms used in referring to the cross-section of a roadway, such as crown, berm, side ditches, berm ditches. How the widths of road-beds are determined, etc., and why some states have laws governing the widths of road-beds for permanent improved roads.

ROAD CONSTRUCTION AND MAINTENANCE.—Explain methods of bidding on and letting road work by contract, etc. Why a bidder needs the map and profile of a road before bidding on same. How the cross-section helps a bidder. How let: by the whole or “lump,” or by the cubic yard. Specifications—map, profile and cross-section made a part thereof by reference thereto. Explain cubic yard and how to calculate it. Contract and bond. Why the contractor should be familiar with the terms and methods used for calculating earth, rock or other road work. Study the method of staking out road work; how lengths of roads are measured by “stations,” and why. Plus-stations, and why. The marking of center and side stakes. Draw diagrams of regular and irregular “cuts” and “fills.” Explain why and when “grade pegs” are driven. Explain various methods of road construction and study the secret of the successful contractor, and what causes “failures.” Necessity of rolling roadway, etc.

What is the meaning of road maintenance. The importance of prompt repairs, and why. What is meant by mechanical structures and the maintenance of same? The importance of opening drain ditches and other waterways. Mud holes and how treated. Necessity of keeping the crowned road-bed in shape. Explain the terms “tight roof” and “dry cellar” in road talk. The sub-grade and its importance. The “split-log” drag and its early origin and use; its universal use today; its solution of the earth-road problem. Explain the advantages and disadvantages of wide and narrow tires, and high and low wheels, on wagons.

IMPROVED ROADS.—Explain the meaning of the term “metal surface,” as used by road-builders. Tell of the several earth-roads—the wooden age in road-building—the corduroy, the charcoal, plank road, pike road or “turnpike” road. Describe the “turnstile.” Tell of the old toll system, and for what the toll was used. Stone tramways, gravel roads, shale roads, shell roads, cobblestone roads, the macadam road, concrete roads. What is concrete, and how made? Proportions of cement, sand and rock, and why? Bituminous concrete; asphalt; how applied, etc. Binders and fillers in rock and brick roads, and what they affect. Oil as a preservative and dust-arrester in roads and streets.

Explain the connection between the conveniences of modern civilized life and good roads; also the relation between improved types of rural schools and good roads. Describe the connection between road building and the victories of both peace and war. Ask your classes to trace the old Roman military roads in Europe that are being used by the armies of today. Ask the children in what way good automobile roads in America contribute to the winning of the war.

Describe the difference between a good road for wagons and automobiles and a properly laid railroad bed. Try to arouse enthusiasm on the subject of good roads as a patriotic duty.

RURAL SCHOOL ARCHITECTURE

Plans and Suggestions for One-
and Two-Room School Houses
with and without Assembly Halls

Department of Education
STATE OF COLORADO

MARY C. G. BRADFORD
State Superintendent of Public Instruction
President State Standardization Board
Denver, Colorado

FOREWORD

“The child who comes to school from a well appointed home has the right to enter a school as good, at least, as the home from which he came; and the child who comes from a neglected home has the right to enter the best school the community and State can produce, and such a school as will beget in him a conscious sense of the dignity of citizenship.”—*Horace M. Rebok.*

PREFACE

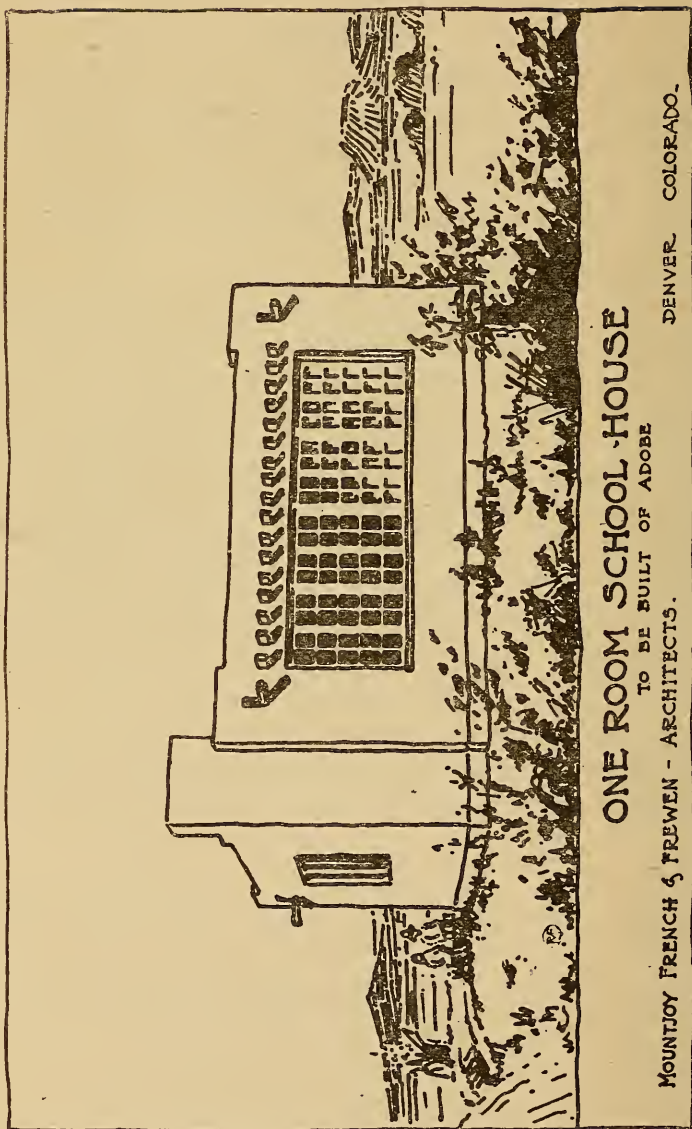
This book is published in the interest of better school buildings in the rural districts of Colorado. The practice of school architecture has been well established and standardized by experience; and the plans shown in this book have been selected to illustrate the application of the more important standards of school planning to the small rural school.

The auditoriums or assembly rooms in some of these plans are not intended for the pupils of the school alone, but also for public meeting of the people of the district. This feature is particularly desirable in districts where no suitable meeting place exists.

The law "Regulating the Practice of Architecture in the State of Colorado" requires, among other things, that plans for all school houses and assembly halls shall be made by an architect who holds a license to practice in the State of Colorado. In selecting an architect, be sure that he is well recommended by the districts for whom he has built school houses, and see that the school he plans for you meets the requirements of modern standards of school architecture (see page 168). No professional man carries greater responsibility to the public in matters of health and safety, and none nearly so great in terms of money, as does the architect; and the good architect, like the good lawyer, is able to earn his fee for the client. The standard fee for full architectural service on general work throughout the United States is six per cent of the cost of the building.

Mary C. C. Bradford.

State Superintendent of Public Instruction.

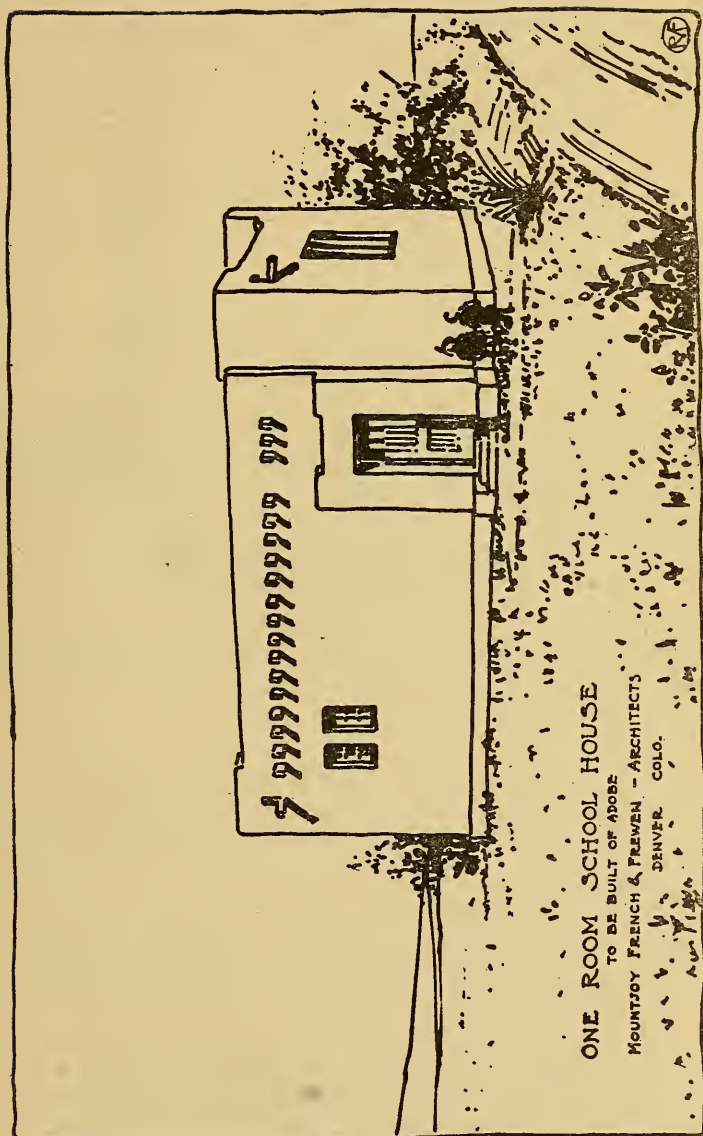


ONE ROOM SCHOOL HOUSE

TO BE BUILT OF ADOBE

MOUNTJOY FRENCH & FREWEN - ARCHITECTS.

DENVER COLORADO.



ONE ROOM SCHOOL HOUSE

TO BE BUILT OF ADOBE

MOUNTJOY FRENCH & FREWEN - ARCHITECTS

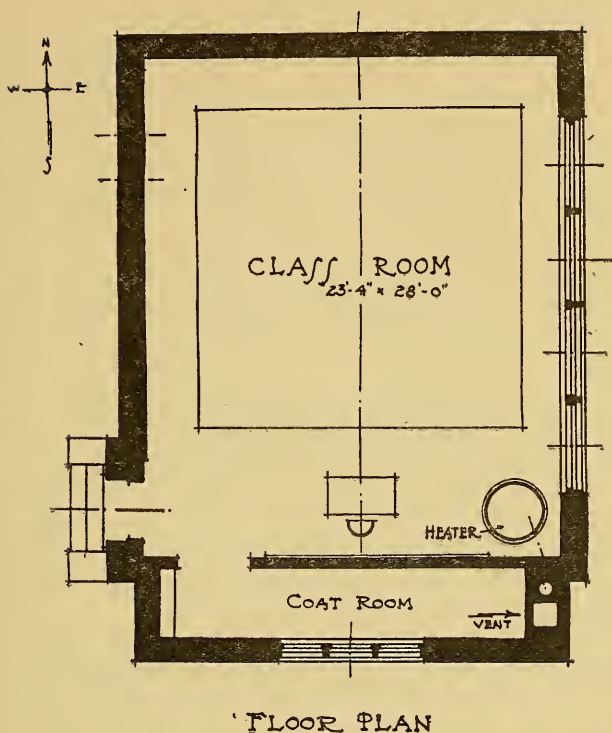
DENVER COLO.

NOTICE

For the benefit of those districts unable to secure the services of a trained expert, and who are compelled by circumstances to rely chiefly upon their own efforts in building, arrangements have been made with

MESSRS. MOUNTJOY, FRENCH & FREWEN
Architects—Denver, Colo.

to supply working drawings of one- and two-room school houses at a small cost to the district.



In some parts of Colorado adobe is easily obtainable and unskilled labor is plentiful. Where these conditions exist, a building can be built of adobe for less money than of any other suitable material.

In districts where the rainfall is not too heavy, a school building properly designed and constructed in adobe should be thoroughly satisfactory, and sufficiently long lived for all school purposes.

The above plan and exterior views on the opposite page are of a one-room school designed for adobe construction. This design is also suitable for concrete construction, and the same plan with changes in the exterior can be made to fit any material.

Where finances will permit the addition of an entrance vestibule, a separate room for the heater and coal, and an additional door from class room to coat room are recommended.

STANDARDS

A few of the more important standards of successful school planning are given below. For more complete information, see the "Official Code of the Boston School House Commission," "American Schoolhouses" by Dresslar, published in Bulletin (1910) No. 5 by the United States Bureau of Education, Department of the Interior; and other schoolhouse bulletins published by this Bureau.

ORIENTATION: Whenever possible, place the building so that the class rooms will receive light from the East. West light is second choice, and North light third choice. Avoid South light in class rooms.

CLASS ROOMS: A class room 23 feet wide by 29 or 30 feet long, with a 12-foot ceiling, will accommodate thirty-five pupils, and makes a very satisfactory unit. In rural districts, however, it is not always possible to limit the classes to thirty-five pupils. A room 24 feet wide by 32 feet long, with a 12½-foot ceiling, will accommodate from forty to forty-five pupils, and no teacher should ever be asked to teach a larger number.

WINDOWS: Place windows on the long side of the class room so that the light will come from the left-hand side of the pupils. The area of window glass shall not be less than one-fifth the floor area of the class room. Place the top of the windows near the ceiling and the sill from 2 feet 6 inches to 3 feet above the floor.

WARDROBES: Wardrobes should adjoin class rooms, and be 4 feet 6 inches to 5 feet wide; provided with doorways connecting with the class room and not the corridor. The approved standard type of Chicago Wardrobe can sometimes be used to advantage.

FLOORS: Class room floors should be air-tight. Much sickness, discomfort, and poor work in school are caused by defective floors.

BLACKBOARDS: The height of the blackboards from the floors should be as follows:

Primary Grades, 20 to 25 inches.

Intermediate Grades, 22 to 26 inches.

Grammar Grades, 26 to 32 inches.

CLOSETS AND CASES: Provide, where possible, a small closet, for the teacher's coat and hat, opening from the class room; and a bookcase in a convenient position. A closet opening from the

class room and of sufficient size to accommodate a Victrola or Phonograph is often desirable.

STAIR CASES: Not over 5 feet wide. Steps about $6\frac{1}{2}$ inches or 7 inches by $10\frac{1}{2}$ inches.

EXITS AND FIRE ESCAPES: See Colorado State Law Regulating Exits and Fire Escapes.

HEAT AND VENTILATION

HEAT: The most satisfactory form of heating within the reach of the small school is a low-pressure gravity steam plant with direct-indirect radiation placed under the windows. Where the steam plant is too expensive, a good large furnace located in the basement or in a small room adjoining the class rooms is preferable to the jacket stove set in the class room, and is only slightly more expensive.

VENTILATION: Systems of forced ventilation are generally too expensive for the small school, the next best system is what is known as "ventilation by gravity." While this system does not always operate satisfactorily under all conditions of weather, it is decidedly better than no system at all, and adds but little to the cost of the building.

"It is in no sense an exaggeration to assert that 75% of the furnaces for heating schools I have examined, are too small for either safety, economy, or health."—Bulletin (1910) No. 5, U. S. Bureau of Education.

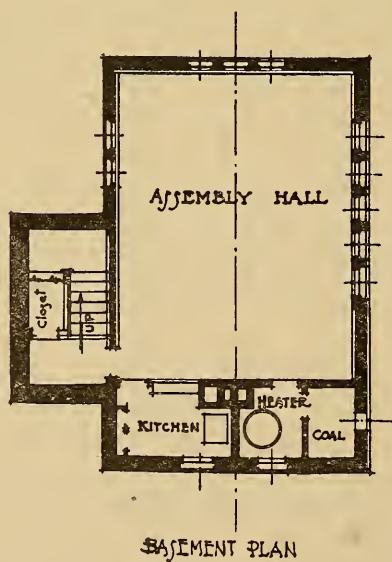
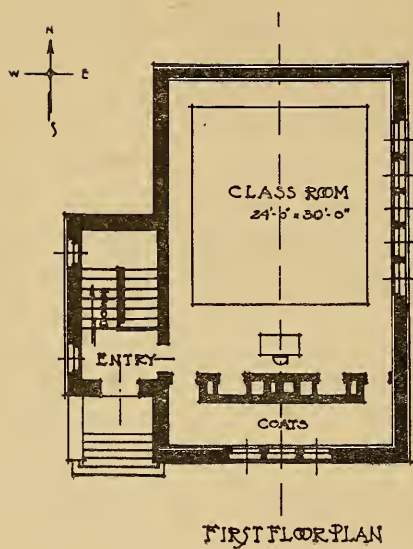
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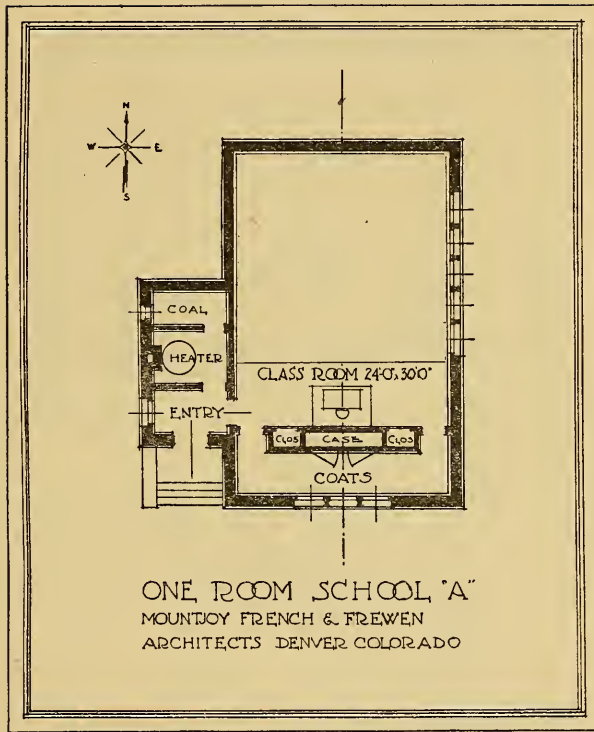
The Colorado State Board of Health, under the State Plumbing Code (adopted June, 1917), control plumbing, sewerage systems, sanitary equipment, and water supply with regard to school houses.

The State of Michigan and several other States have used the indoor chemical closet in districts where no sewerage system exists. These closets have been in use for a number of years and are reported as thoroughly satisfactory.

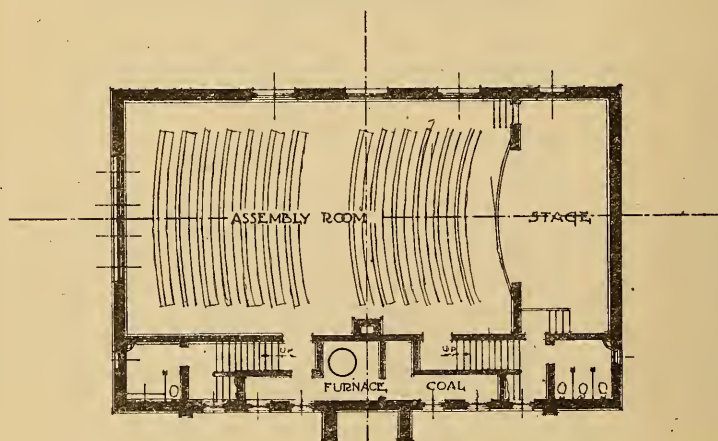
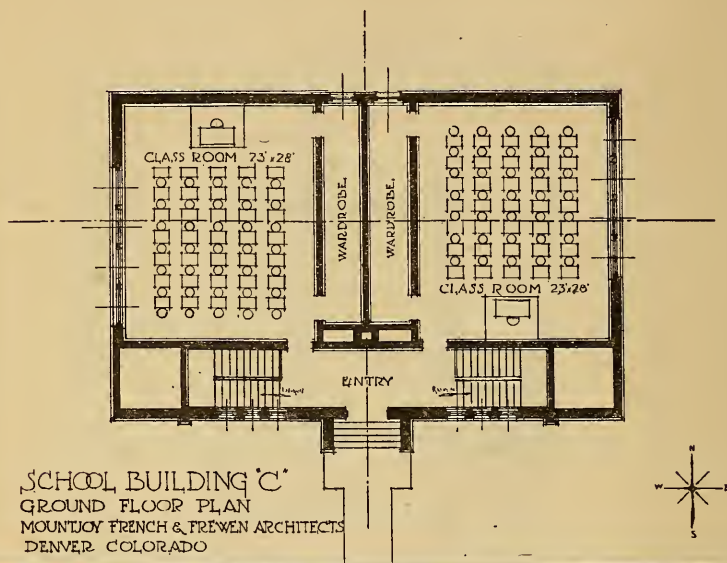
(Reference: Department of Public Instruction, Lansing, Michigan.)

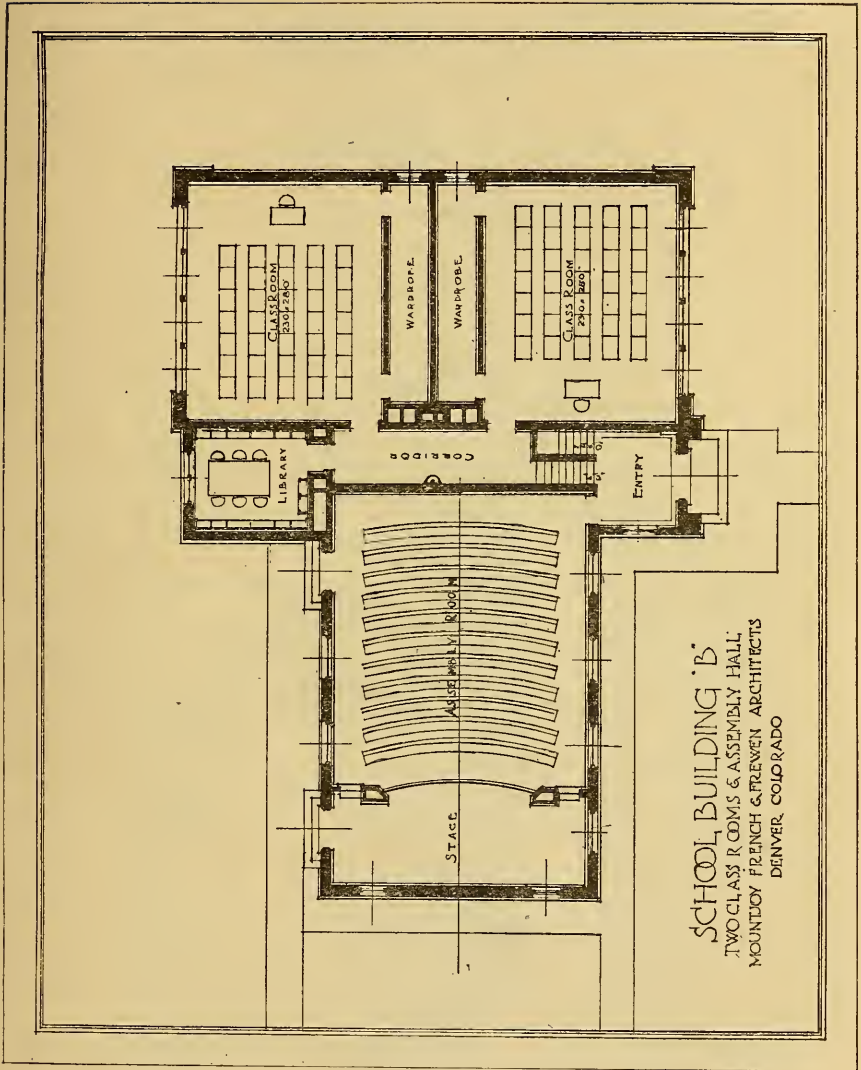
The Colorado State Board of Health, however, advises against chemical closets, and they can not be used without special permit from the Plumbing Division of the State Board of Health.



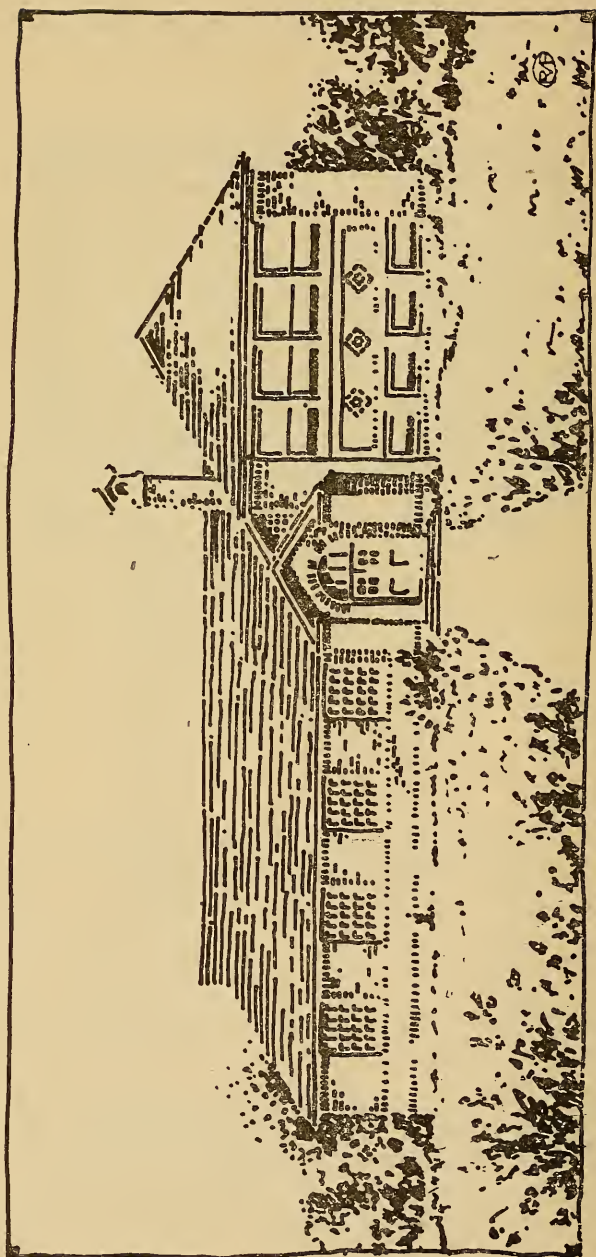


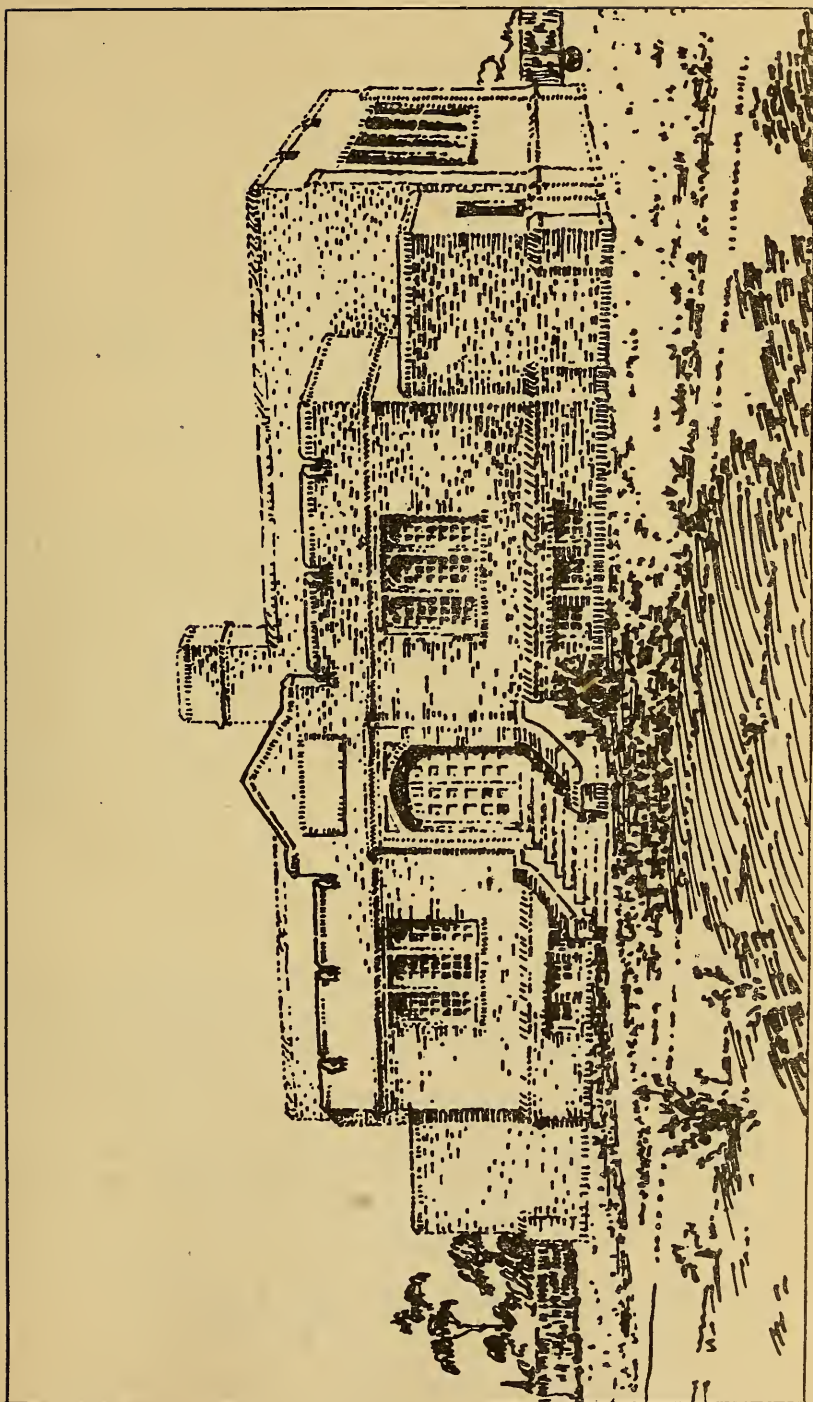
The plan shown above is a good example of a one-room school with furnace and coal outside of class room, yet very accessible. The school plan on the opposite page is similar to the one above, except that the furnace is in the basement, which has an assembly hall and a kitchen where refreshments may be prepared for community gatherings. The assembly room can be used without opening the class room.



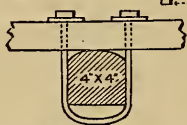
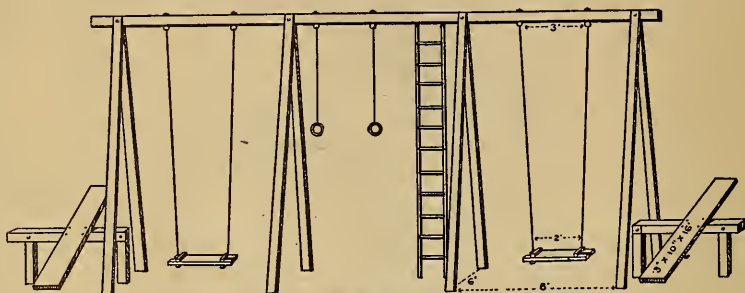


School Building "B" is an interesting example of two class rooms, a library and assembly room, with a possibility of a manual training room, and a domestic science room in the basement. This design gives a very pleasing exterior, and an assembly room which is very satisfactory for public use.

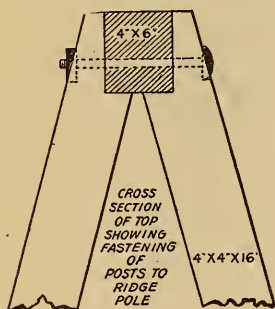
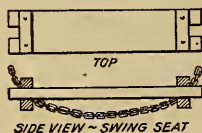




Playground Equipment for Rural Schools



CROSS SECTION
OF TEETER BOARD
SHOWING
U-BOLT FASTENING



NOTE

The above equipment was constructed by teacher and pupils at the Columbine School, Dist. No. 4, Delta Co., at the cost of \$26.39 for all materials, including paint. It has proved to be strong, safe and very enjoyable to the children. It is very attractive and will last several years.

To School Boards and Teachers.

Dear Co-workers: I am submitting the accompanying guide toward the selection of playground apparatus of a standard type. These pieces of equipment are inexpensive and easy to make, yet answer the requirements of healthful recreation and play-exercise. They will meet the demands of the score card, entitling a school to three points toward standardization.

Trusting that these plans may be helpful to the school children—the chief asset of the State of Colorado, whose welfare should be your and my supreme object, I am

Fraternally,

Mary C. C. Bradford.

State Superintendent of Public Instruction.

THE JUNIOR RED CROSS AS A PERMANENT EDUCATIVE AGENCY

This volume of the War-Modified Course of Study for the schools of Colorado, dealing with those subjects that specifically interpret the world of nature and man, would be incomplete without a re-statement of the vital function to be performed by the schools for the world, through the medium of the Junior Red Cross.

Though the Great War to End Wars has come to a victorious conclusion, there is more need than ever for the second line of defense of the Nation's ideals and hopes—the school children—to continue to co-operate in supplying the needs of the world through the Junior membership. The war is over, but the needs created by it have not yet been met. Years of reconstructive work lie before this and every other nation. For long years to come, the united, loving service of all American school children will be necessary if the schools are to be vitally linked to life and made to serve as agents in the rebuilding of civilization.

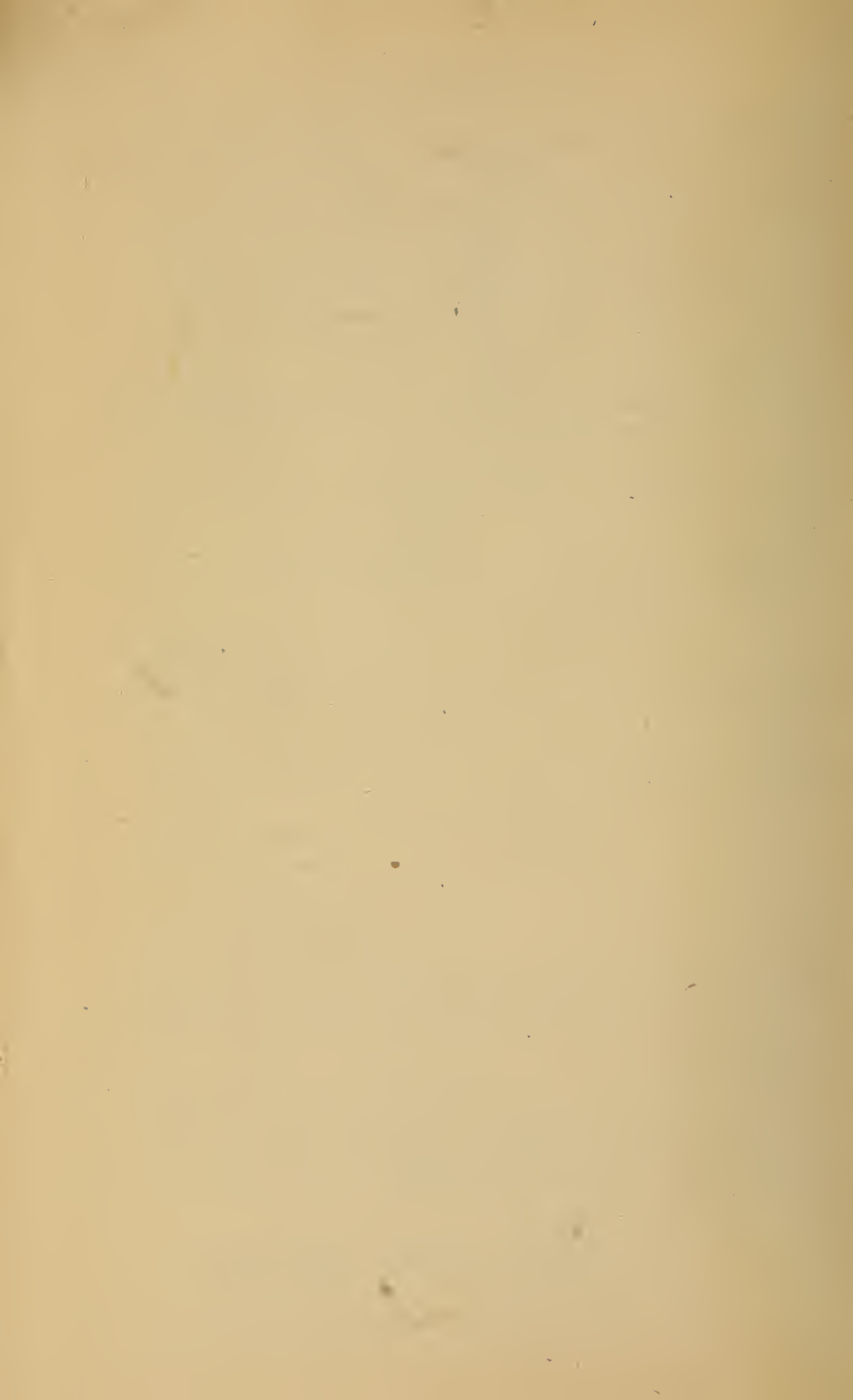
The Junior Red Cross presents so many phases of activity and educative self-expression, that it makes its appeal to every child. Home and foreign service work, the science and art of food conservation and of the production of garments needed for the countries that have suffered most during this devastating war, all offer avenues of self-expressive work and loving service of which the children of America will surely avail themselves.

Teachers have already found that Civics and Patriotism may be wonderfully well taught by means of the Junior Red Cross membership. This agency should continue to be so utilized, even after most of the evil effects of the war have been repaired. The Red Cross has always performed a great work in times of national disaster through famine, flood, fire, plague or any other great dislocation of the normal activity of nature or society. The Junior Red Cross can be made a part of this perpetual humanizing, self-sacrificing service.

I urge upon the teachers of Colorado the further organization of the Junior membership and the intensification of the work already begun, and I am certain that Colorado will greatly add to its already proud record in the forwarding of this—one of the greatest movements of the world.

Mary C. C. Bradford.

State Superintendent of Public Instruction.



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